# WEST VIRGINIA GEOLOGICAL SURVEY

PLATE I.—Falls of Blackwater River over Upper Connoquenessing Sandstone (of Pottsville) at upper end of gorge 1½ miles southwest of Davis. Height of cataract, 57 feet.

WEST VIRGINIA

# GEOLOGICAL SURVEY

## TUCKER COUNTY


By

DAVID B. REGER, Assistant Geologist

Assisted in Field by

W. ARMSTRONG PRICE

and in Office by

R. C. TUCKER


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I. C. WHITE, State Geologist
1923

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WHEELING, W. VA.
1923

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STATE OF WEST VIRGINIA
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## SCIENTIFIC STAFF.

I. C. WHITE.............................*State Geologist*

SUPERINTENDENT OF THE SURVEY.

DAVID B. REGER......................*Assistant Geologist*

W. ARMSTRONG PRICE (to Oct. 1, 1920).....*Paleontologist*

JOHN L. TILTON (from July 1, 1921)........*Paleontologist*

WM. F. PROUTY (from June 15, 1922). ....*Paleontologist*

RIETZ C. TUCKER............*Engineer and Field Assistant*

BERT H. HITE (to Oct. 6, 1921).............*Chief Chemist*

B. B. KAPLAN.................................*Chemist*

JAN B. KRAK (to Jan. 31, 1920)...........*Assistant Chemist*

J. LEWIS WILLIAMS........................*Chief Clerk*

MARIE STENGER..........................*Stenographer*

# LETTER OF TRANSMITTAL.

*To His Excellency, Hon. E. F. Morgan, Governor of West Virginia, and President of the West Virginia Geological Survey Commission:*

SIR: I have the honor to transmit herewith the detailed report and accompanying topographic and geologic maps of Tucker County prepared by David B. Reger, Assistant Geologist, with the aid of the parties he names in his Preface. Like all of Mr. Reger's work, it speaks for itself in exhibiting much laborious field work, and care in its study and elaboration. It confirms the conclusions of Drs. Swartz and Price of the Maryland Survey that the **"Davis" Coal bed** is the representative of the **Upper Freeport Coal** and not of the **Lower Kittanning** with which it had been provisionally correlated by the writer, and also that the **"Thomas" seam**, 190 feet higher, is the **Bakerstown Coal** of the Conemaugh Series and not the **Upper Freeport Coal** at the top of the Allegheny Series as formerly supposed. This revision of the nomenclature in the North Potomac coal field will not affect the well-known character of the coals themselves but only the names under which they have heretofore been classified, although as a matter of fact they will always retain the local names **"Davis"** and **"Thomas"** given them when first exploited by Hon. H. G. Davis, his brother Thomas B., and Hon. Stephen B. Elkins, 30-odd years ago, since it is the universal experience that local names once firmly attached to particular coal beds can not be permanently displaced by others, however correct or appropriate.

The mineral wealth of Tucker County is mostly comprised in its coal beds, limestones, and soils. Its coals are of high quality and have the advantage of a practically all downgrade haul to tide-water.

Its Mountain or Greenbrier Limestone is the same formation which has been so successfully operated for the manufacture of Portland cement at Manheim in Preston County and with unlimited quantities of this limestone in the immediate vicinity of good coal deposits, a large industry in the manufacture of Portland cement could readily be established in Tucker County.

The wonderful possibilities for hydroelectric installations on the waters of Cheat River and its numerous tributaries, with enormous storage reservoirs easily constructed in the upper reaches of this stream, will constitute a great source of light, heat, and power for Tucker County long after its coal beds have been exhausted and remain only a memory.

The Survey was fortunate in securing the services of Dr. Geo. H. Girty, a very skillful paleontologist connected with the United States Geological Survey, in the preparation of a very valuable paper on the fossil marine life of the Greenbrier Limestone and the Mississippian beds generally. This valuable and interesting contribution to our knowledge of the animal life of the Mississippian beds, prepared by Dr. Girty as a "labor of love," is published on pages 450 to 488 inclusive. It had been the intention of Dr. Wm. Armstrong Price, the former paleontologist of our Survey to join Dr. Girty in the preparation of a paper on the Greenbrier fossils, but business engagements prevented Dr. Price from carrying out his original intention, although he assisted Dr. Girty in the collection of fossils at some of the localities examined, and this is fully acknowledged by Dr. Girty in his contribution.

The soil report and soil map of Tucker County have been completed by the soil experts of the United States Bureau of Soils and should be issued within a few weeks.

I. C. WHITE, *State Geologist.*

Morgantown, W. Va., March 15, 1923.

# CONTENTS.

## PART III. MINERAL RESOURCES.

## PART IV. PALEONTOLOGY.

# ILLUSTRATIONS.

**Maps I and II in Atlas (Under Separate Cover).**



**Plates.**

## Figures.

# AUTHOR'S PREFACE.

This book is a general geological report on Tucker County. As shown by the table of contents it contains a short historical and industrial sketch, a chapter on Physiography, nine chapters on Structure and Stratigraphy, five chapters on Mineral Resources, and a chapter on Paleontology, as well as an Appendix giving all available spirit-level bench marks and railroad levels in the county.

In order to describe the several coals, possible oil and gas sands, and other economic horizons in their proper stratigraphic sequence, it was necessary to make an exhaustive study of the entire rock system, both surface and underground, as deep as information was available, the results of which are embodied in the text in the form of geologic sections and detailed descriptions. Some of this matter may not be of interest to the casual reader but its value to professional men conducting future coal operations and other economic mineral pursuits can not be questioned. In each geologic section certain physical facts, including thicknesses, intervals, colors, and general characteristics of rock strata and coals, are presented just as obtained in the field, which, except for minor errors, can not be changed by subsequent investigation. These facts are followed by the author's interpretation or correlation, based in some cases on opinion where certain essential facts are lacking, and some of these will doubtless require revision after more detailed researches and prospects have been made by future workers in particular localities. On all such points the author will welcome kindly criticisms and suggestions, as the aim has been to give all available facts and to draw conclusions based on present knowledge, which in many places is incomplete, owing to concealed strata, or to the lack of prospects or borings or other data. In the region where the Conemaugh and Allegheny coal strata exist a large amount of diamond drill prospecting has been done by various

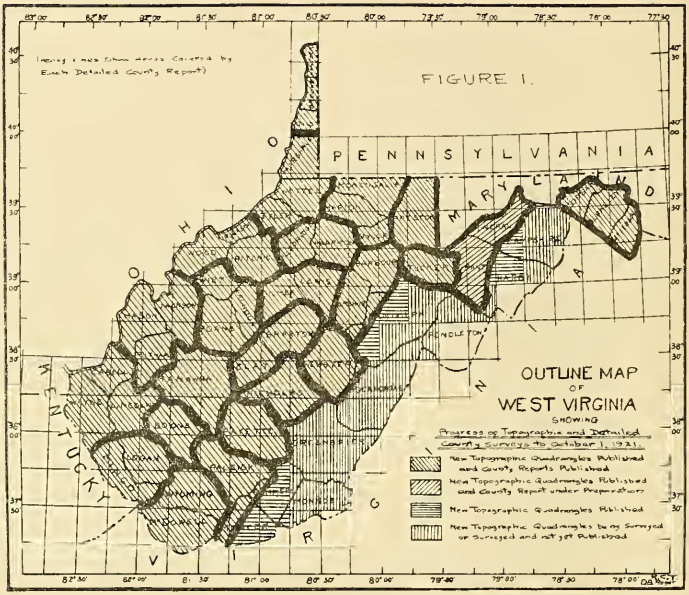
FIGURE 1.
(Heavy Lines Show Areas Covered by Each Detailed County Report)
OUTLINE MAP
OF
WEST VIRGINIA
SHOWING
Progress of Topographic and Detailed County Surveys to October 1, 1921.
New Topographic Quadrangles Published and County Reports Published
New Topographic Quadrangles Published and County Report under Preparation
New Topographic Quadrangles Published
New Topographic Quadrangles being Surveyed or Surveyed and not yet Published
PENNSYLVANIA
MARYLAND
OHIO
KENTUCKY
VIRGINIA
PENDLETON

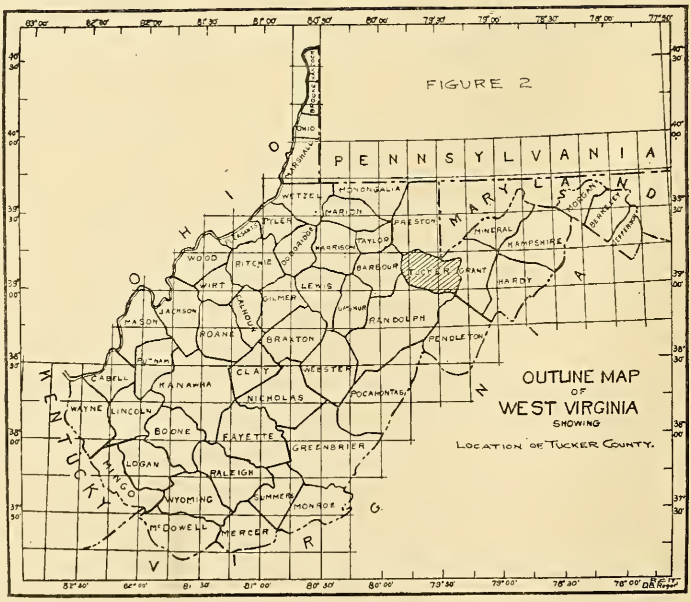
FIGURE 2
OUTLINE MAP
OF
WEST VIRGINIA
SHOWING
LOCATION OF TUCKER COUNTY.
PENNSYLVANIA
MARYLAND
OHIO
KENTUCKY
VIRGINIA
HANCOCK
BROOKE
OHIO
MARSHALL
WETZEL
MONONGALIA
MARION
PRESTON
TYLER
PLEASANTS
DODDRIDGE
HARRISON
TAYLOR
WOOD
RITCHIE
BARBOUR
TUCKER
GRANT
MINERAL
HAMPSHIRE
MORGAN
BERKELEY
JEFFERSON
HARDY
WIRT
LEWIS
CALHOUN
GILMER
UPSHUR
RANDOLPH
JACKSON
MASON
ROANE
BRAXTON
PENDLETON
PUTNAM
CABELL
CLAY
WEBSTER
KANAWHA
WAYNE
LINCOLN
NICHOLAS
POCAHONTAS
BOONE
FAYETTE
GREENBRIER
LOGAN
MINGO
RALEIGH
WYOMING
SUMMERS
MONROE
McDOWELL
MERCER

operators and owners, through the generous cooperation of whom nearly all of these extremely valuable records can now be given to the public, and thus preserved for all time.

The special attention of the cement and lime trade is called to Chapter XIV, where the limestone resources of the county are described by detailed statement or reference. It is believed that the great abundance and easy accessibility of this resource, as well as its favorable chemical character, will justify exhaustive investigation with a view toward the installation of Portland cement mills of large capacity. The attention of electrical engineers is called to Chapter XV, in which the water-power resources are briefly summarized. In addition to the fundamental supply of water and to the presence of many natural sites for dams, the important consideration of riparian damages will be found extremely favorable to interested corporations, as nearly all the areas where flooding would be necessary are sparsely settled and few valuable mineral rights will be jeopardized.

Two maps accompany the Report in a separate atlas, Map I showing the topography and Map II the geology. Map I is assembled and photolithographed from the standard topographic quadrangles as surveyed and published by the U. S. Geological Survey in cooperation with the West Virginia Geological Survey, certain additions and corrections, principally railroads and place names, being added by the author. Map II, made up from the same base, gives not only the outcrops of the various series and minable coals but also shows by number the exact locations of all coal test borings, and coal mines, prospects, and exposures, the numbers on the map corresponding to those used in the text. Besides these separate maps, 11 figures appear in the text, Nos. 7 to 11 of which are intended to show at a glance where the several coal seams are of minable thickness and purity. Most of these figures are accurate in general but their scale is too small to show local barren areas, and the borings and descriptive matter of the text should therefore be consulted in every case. An exception must be made to this inclusive statement in the figure showing Sewell (Sharon?) Coal, as no borings have reached its horizon in the northeastern corner of the county. The indication of its probable northern extent is based on available subordinate data and should be regarded as an opinion rather than fact from positive evidence.

The author spent several months of the field season of 1919 in the county, a portion of which was familiar ground as it was his fortune to have assisted in the preparation of some of the topographic maps in the year 1906. In the field work, able assistance was given by Dr. W. Armstrong Price, Paleontologist of the Survey Staff, who in addition to his faunal studies, devoted several weeks to the stratigraphy of the Catskill and Chemung Series of the Devonian, the results of which are embodied in the structure contour map of the Hendricks Sandstone horizon and the cross-sections on Map II, in several measured sections in Chapter IV, in the detailed account of the Chemung and Portage Series in Chapter XI, and in various special discussions throughout the text, all of which are properly accredited.

Valuable office assistance was rendered by Mr. R. C. Tucker, of the Survey Staff, who prepared much of the statistical matter, duly credited in the text, compiled the Index and Appendix, made the final draft of the maps and most of the figures, and proof-read the manuscript. Acknowledgment is made, also, of the work of Miss Marie Stenger, Stenographer of the Survey, who copied the manuscript, and of Mrs. George R. Farmer, private secretary of the author, who assisted in the compilation and transcription of data.

The chemical analyses and calorific tests, except as otherwise specified in the text, were made by J. B. Krak, former Assistant Chemist, and B. B. Kaplan, present Chemist, working under the direction and with the assistance of the late B. H. Hite, Chief Chemist, in the laboratory of the Survey. The well-known professional ability of these three scientists insures the accuracy of all the tests accredited to them.

To parties outside of the Survey Staff, special acknowledgment is made to the Davis Coal and Coke Company, which through its Chief Engineer, Mr. S. B. Jeffries, and other members of its technical force, furnished the records of many coal test borings and other valuable data ; to the Wayne Coal Company for similar matter, through Messrs. S. M. Dunbar and

G. T. Warren, General Manager and Chief Engineer, respectively; to the heirs of Robert Bridges for coal test records; to the Parsons Pulp & Lumber Company, through its General Manager, Mr. J. B. Wilt, for the record of the deep oil test at Parsons; and to Mr. W. F. Lipscomb, agent of the Central West Virginia Fire Protective Association, for free guidance to several localities of interest. It is manifestly impossible to make detailed mention of the great number of Tucker County citizens who most generously furnished entertainment and local guidance often at personal inconvenience to themselves, but to all of these general acknowledgment is made both personally and in the name of the State whose interest was served.

Finally the author expresses his obligation to Dr. I. C. White, State Geologist, whose constant supervision, most kindly criticisms, and instructive suggestions have added greatly to the value of this Report.

DAVID B. REGER.

Morgantown, W. Va., April 1, 1922.

## ERRATA.

Page 17, line 7 from top, for "mines," read "miles."
Page 68, line 2 from top, for "Hendrick," read "Hendricks."
Page 89, line 16 from bottom, for "above," read "about."
Page 91, line 19 from top, for "Hyee," read "Hyle."
Page 92, line 18 from top, for "betwen," read "between."
Page 97, Omit top line (repeated from p. 96).
Page 124, line 10 from top, for "party–," read "part–."
Page 127, line 8 from bottom, for "823," read "923."
Page 142, line 24 from bottom, for "brachopods," read "brachiopods."
Page 142, line 20 from bottom, for Interval "373," read "372."
Page 153, line 12 from bottom, under Interval column, add "19."
Page 157, line 10 from bottom, after "Tucker," add "at Fairfax Knob."
Page 167, line 17 from bottom, add period (.) at end of line.
Page 167, line 12 from bottom, for "Figue," read "Figure."
Page 174, line 13 from bottom, for "economical," read "economic."
Page 174, line 9 from bottom, after "Company," add "Prospect."
Page 214, lines 16 and 15 from bottom, for "va-rions," read "va-rious."
Page 211, line 10 from bottom, after "Douglas," insert comma (,).
Page 229, line 14 from bottom, for "9937," read "99.37."
Page 257, line 4 from bottom, add period (.) before "Spirifer."
Page 307, line 19 from bottom, for "elavation," read "elevation."
Pages 316, lines 8 and 9 from top, for "Kittan-ing," read "Kittanning."
Page 317, line 6 from bottom, for "miles," read "mile."
Page 339, line 25 from bottom, Omit "Ewing."
Page 349, line 10 from top, for "38 0," read "38 6."
Page 367, line 18 from bottom, for "3′ 4″," read "2′ 4″."
Page 418, line 18 from top, for "(125′ B.) 10′ to...10 0," read "(1725′ B.) 10′ to 15 0."
Page 418, line 9 from bottom, for "cemented," read "concealed."
Page 429, line 8 from bottom, for "igenous," read "igneous."
Page 433, line 2 from top, for "quarzitic," read "quartzitic."
Page 443, line 7 from top, for "$K^2O$," read "$K_2O$."
Page 451, bottom line, for "447-447," read "487-488."
Page 463, line 5 from top, for "innatus," read "inflatus."
Page 472, lines 9 and 8 from bottom, for "Cam-popyllum," read "Cam-pophyllum."
Page 477, line 4 from bottom, for "lost," read "lots."
Page 491, line 3 from top, for "VD" (two places), read "$\sqrt{D}$" (square root of D).

# PART I.

## History and Physiography.

## CHAPTER I.

### HISTORICAL AND INDUSTRIAL DEVELOPMENT

#### LOCATION.

Tucker County, comprising the subject of this report, is situated in the northeastern portion of West Virginia. The appearance of its general outlines on the map is that of a rough rectangle, the longer axis of which extends from northwest to southeast and the shorter of which extends from northeast to southwest, the former being approximately 30 miles and the latter approximately 17 miles. In geographical position the county lies between the parallels of 38° 57′ and 39° 17′, North Latitude, and the meridians of 79° 17′ and 79° 51′, West Longitude from Greenwich. It is bounded on the north by Preston County (West Virginia), Garrett (Maryland) and Grant (West Virginia); on the east by Grant; on the south by Grant and Randolph; and on the west by Randolph and Barbour Counties. Its area is almost wholly included in the drainage basin of Cheat River, there being about one square mile of territory drained by the North Branch of the Potomac River, and a few square miles drained by tributaries of Tygart Valley River.

The geographical position of the county may be observed on Figures 1 and 2 in this Volume and on Maps I and II, enclosed in a separate atlas accompanying this Report.

# TRANSPORTATION.

## WATER WAYS.

Although drained by Cheat River, a watercourse of considerable volume formed by the junction of two large tributaries at Parsons, the county-seat, and thence flowing northward for 11.7 miles (air-line measure) to the northern boundary, Tucker County has no water transportation. The extremely swift current, shallow and rock-strewn bed of Cheat precludes an attempt at navigation with boats. Before the advent of railroad transportation, logs were sometimes floated down the main river as well as numerous of its tributaries at times of flood, but only at great personal hazard to those engaged and often with the loss of life and timber. In this early stage splash-dams were extensively employed on the tributary streams in order to augment the natural volume of water. No attempt has ever been made to build locks and dams on Cheat River, and owing to the great number required on account of the swift current, no artificial system of navigation would be justified.

## STEAM RAILROADS.

### Western Maryland Railway—Main Line.

The main line of the Western Maryland Railway, extending from Baltimore, Maryland, westward to Belington, Barbour County, West Virginia, a distance of 292.3 miles, and having a large coal, general freight, and passenger business, is the principal commercial carrier of Tucker County. Entering the county at Fairfax Summit, near the southwestern corner of Maryland, this line passes southwestward, via Thomas, down the North Fork of Blackwater River to its mouth and thence westward down the precipitous gorge of the latter stream, where a most excellent panorama of mountain scenery is fully exposed to the view of the traveler, to Hendricks at the junction of the Blackwater with Dry Fork of Cheat River, and thence westward down the latter stream to Parsons. From Parsons its course is generally westward up Shavers Fork of Cheat to Porterwood, and thence up Haddix Run of the latter stream to the Randolph County Line, the distance from the latter point to Fairfax Summit being 24.9 miles. Throughout almost its entire distance in the county it is flanked on either side by high mountains whose rugged sides present a scenic effect seldom duplicated in the State. According to L. F. Timmerman, Secretary and Treasurer, this road was merged into a trunk line August 6, 1906, by the completion of a connection sixty miles long, between what was formerly known as Western Maryland Railroad Company at Big Pool, Maryland, and West Virginia Central and Pittsburgh Railway Company at Cumberland, Maryland, the latter line having been previously absorbed by the parent corporation November 1, 1905.

According to Maxwell[1] the original railroad through Mineral, Grant, and Tucker Counties was first organized as the Potomac and Piedmont Coal and Railroad Company in 1866, but was reorganized under the name of West Virginia Central and Pittsburgh Railway June 25, 1881. Construction from Piedmont westward was begun about April 20, 1880, completed to Elk Garden October 29, 1881; to Thomas and Davis November 1, 1884; to Parsons early in 1889; to Elkins August 18, 1889; and to Belington, May 1, 1891.

**The Western Maryland Railway—Davis Branch.**—The Davis Branch of the Western Maryland Railway extends from Thomas by a tortuous course, 6.3 miles long, southward to Davis, general freight and passenger service being afforded. According to Maxwell this branch was completed November 1, 1884, as stated above.

**The Western Maryland Railway—Sand Run Branch.**—The Sand Run Branch of the Western Maryland Railway extends from Sand Run Junction up Sand Run of North Fork of Blackwater River, a distance of 2 miles via Pierce, general freight and passenger service being afforded by shuttle trains which operate between Davis and Pierce, passing over the main line between Thomas and Sand Run Junction. According to P. Cain, Division Engineer of the Company, this branch was completed in 1912.

[1]Hu Maxwell, History of Randolph County, pp. 287-289; 1898.

**The Western Maryland Railway—Snyder Run Branch.**—The Snyder Run Branch of the Western Maryland Railway extends from Snyder Run Junction to Benbush, a distance of 1.59 miles, affording an outlet for several mines. According to H. R. Pratt, Chief Engineer, this branch was completed the early part of 1911.

**Porterwood Lumber Company Railroad.**—The Porterwood Lumber Company Railroad, tributary to the Western Maryland system at Porterwood, is a standard gauge line extending southward up Shavers Fork of Cheat River 8 miles, of which 4.5 miles are within Tucker County. Construction was begun about the time the mill was established in 1913 and is continued from time to time as the needs of the company require. Its business is primarily that of hauling logs to the mill; no general freight or passenger service being afforded but a supply car is run at certain times to accommodate residents along the line.

**Central West Virginia and Southern Railroad.**—The Central West Virginia and Southern Railroad, tributary to the Western Maryland Railway at Hendricks, is a standard gauge road extending southward from that point up Dry Fork of Cheat River to Horton, Randolph County, a distance of 31.3 miles of which 17 miles are in Tucker County. Of the above mileage over which trains are operated 29½ miles are owned by the railroad company and the remainder by the Parsons Pulp and Lumber Company, the latter trackage being at the southern end, next to Horton. According to A. S. Lindsey, General Manager, the road was begun in October, 1895, under the name of Dry Fork Railroad, and was operated under that title until January 1, 1913, when the name was changed to its present status. This railroad affords a general freight and passenger service, its principal outbound freight being lumber and pulp wood, general supplies being hauled on the return trip.

**Glady and Alpena Railroad.**—The Glady and Alpena Railroad, tributary to the Central West Virginia and Southern at Gladwin, is a standard gauge line extending southwestward up Glady Fork of Dry Fork of Cheat River to Evenwood, Randolph County, a distance of 18 miles, of which 3 miles are in

Tucker County. This road, which was completed to Evenwood in 1904, according to L. R. F. Preysz, Auditor, was built primarily to haul lumber from the mill of the Raine-Andrews Lumber Company at Evenwood, but also affords freight and passenger service.

**Laurel River Lumber Company Railroad.**—The Laurel River Lumber Company Railroad, tributary to the Central West Virginia and Southern Railroad at Jenningston, is a standard gauge road extending southwestward up Laurel Fork of Dry Fork of Cheat River a distance of 27 miles, of which 0.3 mile is in Tucker County, its business being almost wholly confined to hauling logs to the company mill at Jenningston. No general freight or passenger service is afforded, as the region through which it passes is but sparsely inhabited. Construction was begun in 1906 and has been continued from time to time as the needs of the company have required.

**Babcock Lumber and Boom Company Railroad—Main Line.**—The Babcock Lumber and Boom Company Railroad, tributary to the Davis Branch of the Western Maryland Railway at Davis, is a standard gauge line extending from Davis eastward up Blackwater River to the foot of Cabin Mountain where it divides into two branches, one of which extends eastward across Cabin Mountain via Stony River Dam to the Alleghany Front, and the other of which extends southward up the Canaan Valley to the foot of Bald Knob, additional lateral branches having been built at various points, which, with the included main line, make a total trackage of 31 miles. Its principal function is that of hauling logs to the company mill at Davis, no general freight or passenger service being afforded.

**Babcock Lumber and Boom Company Railroad—Beaver Creek Branch.**—The Beaver Creek Branch of the Babcock Lumber and Boom Company, tributary to the Davis Branch of the Western Maryland Railway at Davis, is a standard gauge road extending northeastward up Beaver Creek to a point one-half mile west of Gatzmer, a distance of 5.8 miles. This road was built by the Beaver Creek Lumber Company many years ago for the purpose of hauling logs to its mill at Davis but since the operations of that corporation ceased some years ago the railroad has not been used and is at present not in good repair, having been but recently acquired by the present owners.

**The Preston Railroad.**—The Preston Railroad, tributary to the Baltimore and Ohio Railroad at Hutton, Maryland, extends southward through Garrett County, Maryland, and Preston and Tucker Counties, West Virginia, its course in the latter county being down Horseshoe Run of Cheat River to the mouth of Maxwell Run, three miles from Cheat River, into which Horseshoe Run empties. The distance from Hutton to the Tucker County Line is 18.5 miles, there being 13.3 miles of track within the latter county, including certain lateral branches. Its business within the county is largely confined to hauling logs to the mill of the Kendall Lumber Company at Crellin, Maryland, a limited amount of freight service being afforded.

## HIGHWAYS.

The present highway system of Tucker consists almost entirely of dirt roads, most of which are extremely narrow, crooked or steep, there being only 3.5 miles of macadam in the county.

### Class "A" Roads.

According to the official map of the State Road Commission, the Class "A" roads of the county, all of which are intended to be improved with a hard surface, are the following: (1), A road from Parsons northward along Cheat River to Hannahsville and thence northwestward up Long Run of Cheat River to the Preston County Line, a total distance of 19 miles. Of this road 10 miles, lying between Parsons and St. George, have an improved surface, available for automobile traffic during the greater part of the year, the remainder being traveled with difficulty, even during the summer months. (2), A road from Parsons southwestward up Shavers Fork of Cheat River to Porterwood and thence westward up Haddix Run of that stream to the Randolph County Line, a distance of 8 miles, from which point it extends down Leading Creek to

Elkins. This road is in fair condition to Porterwood, the remainder being entirely unimproved, the principal traffic between Parsons and Elkins being by way of the Pheasant Run road which branches westward from Shavers Fork $2\frac{1}{2}$ miles above Porterwood. (3), A road from Parsons to Davis and Thomas, West Virginia, and Oakland, Maryland, extending from Parsons southwestward up Dry Fork of Cheat River via Hendricks to Flanagan Hill (Red Creek P. O.), and thence northeastward into the Canaan Valley via Buena and Cortland, and thence northward and northwestward to Davis and Thomas, and thence northward to the Preston County Line. Of this road that portion between Parsons and Hendricks has a fairly well improved dirt surface, and that portion between Hendricks and Flanagan Hill is crooked, narrow, and steep, being dangerous even during the summer months. From Flanagan Hill there is an improved dirt surface to a point 2 miles north of Buena, from which point there is limestone macadam to the foot of Canaan Mountain, a distance of $3\frac{1}{2}$ miles. From Canaan Mountain to Davis there is a good dirt surface and from Davis to Thomas it is improved with cinders, this portion being passable for automobile traffic throughout the year. From Thomas to the Preston County Line there is an improved dirt road. The entire length of the road from Parsons to the Preston County Line is 37 miles. Owing to the unsatisfactory condition of this road between Hendricks and Flanagan Hill, traffic between Parsons, Thomas, and Davis is almost entirely confined to the Horseshoe Run route via Leadmine village. (4), A road from Flanagan Hill (Red Creek P. O.), eastward via Laneville and thence through the northeast corner of Randolph County to Hopeville and Petersburg, Grant County. This road is in fair condition to Laneville, but beyond that point to the Grant County Line is entirely unimproved, being seldom used even for wagon travel. The distance from Flanagan Hill to the Randolph County Line is 11 miles.

## Secondary Roads.

According to the report of the State Road Commission for 1914 Tucker County has a total of 915 miles of road, including those described above under the Class "A" System. For the most part the secondary roads are narrow and steep, many of them being only sled trails. Automobile traffic is possible over portions of these roads during the summer months.

## GENERAL DESCRIPTION

### MISCELLANEOUS ITEMS.

**Formation.**—According to Lewis[2], Tucker County was formed March 7, 1856, by Act of the Virginia General Assembly, its territory having been taken from that of Randolph County. Maxwell[3], however, states that the county was formed on March 6, and is authority for the further statement that the size of the county was increased in a subsequent year by the addition of certain territory taken from Barbour County. It was named in honor of St. George Tucker, an eminent Virginia jurist.

**Area.**—The present area of Tucker County, as determined with planimeter by R. C. Tucker from the topographic sheets of the United States Geological Survey, is as follows:

| Districts. | Square Miles. |
|---|---|
| Licking | 29.78 |
| Clover | 37.89 |
| St. George | 66.10 |
| Black Fork | 78.18 |
| Fairfax | 25.70 |
| Davis | 60.83 |
| Dry Fork | 123.19 |
| Total for County | 421.67 |

**Relief.**—The surface of Tucker varies in elevation from 1450 feet at the point where Cheat River crosses the Tucker-Preston County Line to 4420 feet at Wiess Knob just north of Laneville and near the southeastern corner of the county, making a total difference of 2970 feet.

**Climate.**—The climate of Tucker County is bracing and healthful, deriving its character from the great mountains that

[2] Virgil A. Lewis, History of West Virginia, pp. 727-728; 1889.

[3] Hu Maxwell, History of Tucker County, pp. 121-124; 1884.

traverse its length. In the valleys of Cheat River and its two larger tributaries, Shavers Fork and Dry Fork, no greatly perceptible difference of temperature and vegetation from that found in the other northern counties of the State is evident, except that the summer season between killing frosts is somewhat shorter. On the high plateau east of Backbone Mountain and Dry Fork of Cheat River, however, where the prevailing altitude above sea-level is more than 3,000 feet, the air is very much cooler throughout the year, and vegetation shows a corresponding difference. Frosts in this region may occur during any month of the year, and snow is not infrequent even in the late spring, the writer having once witnessed a snow-storm of considerable proportions on Canaan Mountain June 14, 1906. The following statistics concerning temperature, precipitation, and snowfall at Parsons, furnished by H. C. Howe, Section Director, United States Weather Bureau, Parkersburg, West Virginia, give the main climatological facts, the observations having been taken by Mr. S. W. Swisher:

Average Monthly Temperature, Parsons, W. Va.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept | Oct | Nov | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1899 ... | 32.4 | 26.8 | 42.7 | 50.6 | 61.9 | 69.2 | 71.6 | 71.2 | 61.8 | 54.8 | 54.0 | 34.2 | 51.8 |
| 1900 ... | 31.8 | 25.8 | 34.2 | 48.8 | 60.9 | 68.8 | 69.6 | 72.9 | 67.5 | 57.6 | 43.0 | 31.2 | 51.0 |
| 1901 ... | 30.9 | 23.0 | 39.5 | 45.0 | 58.4 | 68.8 | 75.8 | 71.4 | 60.7 | 52.0 | 36.0 | 31.2 | 49.4 |
| 1902 ... | 27.6 | 25.2 | 41.2 | .... | 58.8 | 64.4 | 71.7 | 67.6 | 62.5 | 53.3 | 46.5 | ... | .... |
| 1903 ... | 31.5 | 31.3 | .... | .... | 61.3 | 63.0 | 70.5 | 68.4 | 59.8 | 50.8 | 37.0 | 24.5 | .... |
| 1904 ... | 25.4 | 26.6 | 41.6 | 45.7 | 58.7 | 66.6 | 68.6 | 67.4 | 64.4 | 51.0 | 38.7 | 29.8 | 48.7 |
| 1905 ... | .... | 24.8 | 43.4 | 48.8 | 60.6 | 66.4 | 70.6 | 68.1 | 62.9 | 52.0 | 38.8 | 33.6 | .... |
| 1906 ... | 37.2 | 31.3 | 35.8 | 50.0 | 58.8 | 68.3 | 69.4 | 73.2 | 67.4 | 53.2 | 42.4 | 34.6 | 51.8 |
| 1907 ... | 36.3 | 28.8 | 46.3 | 41.7 | 56.0 | 62.1 | 68.2 | 66.5 | 63.7 | 48.0 | 39.2 | 32.4 | 49.1 |
| 1908 ... | 27.4 | 28.6 | 44.7 | 50.8 | 60.3 | 66.4 | 71.4 | 68.1 | 63.2 | 51.9 | 40.1 | 33.6 | 50.5 |
| 1909 ... | 35.4 | 38.4 | 37.9 | 49.7 | 57.8 | 69.2 | 67.3 | 68.3 | 61.6 | 47.0 | 47.6 | 25.8 | 50.5 |
| 1910 ... | 31.0 | 31.1 | 47.2 | 51.0 | 55.3 | 64.3 | 71.8 | 68.1 | 66.0 | 56.4 | 34.6 | 25.8 | 50.2 |
| 1911 ... | 36.4 | 36.6 | 37.4 | 47.2 | 63.2 | 67.9 | 70.4 | 71.6 | 66.8 | 54.6 | 38.6 | 38.4 | 52.4 |
| 1912 ... | 22.2 | 25.6 | 38.4 | 54.1 | 60.2 | 64.0 | 70.2 | 66.2 | 66.6 | 53.0 | 39.8 | 34.2 | 49.5 |
| 1913 ... | 38.7 | 30.6 | 43.6 | 49.2 | 58.4 | 66.7 | 70.8 | 69.6 | 61.6 | 52.8 | 41.5 | 33.6 | 54.4 |
| 1914 ... | 32.0 | 26.7 | 32.0 | 49.6 | 59.1 | 68.4 | 69.4 | 68.7 | 59.4 | 55.4 | 40.6 | 27.8 | 49.1 |
| 1915 ... | 31.8 | 36.1 | 31.1 | 51.2 | 57.4 | 63.8 | 68.8 | 67.0 | 65.1 | 55.0 | 41.3 | 29.7 | 49.9 |
| 1916 ... | 36.0 | 30.6 | 35.6 | 47.3 | 61.9 | 62.8 | 71.2 | 69.2 | 58.4 | 50.9 | 40.4 | 31.2 | 49.6 |
| 1917 ... | 31.5 | 29.7 | 38.8 | 48.9 | 53.0 | 64.2 | 69.7 | 68.8 | 59.6 | 46.3 | 36.6 | 22.9 | 47.5 |
| 1918 ... | 21.3 | 33.6 | 44.8 | 48.4 | 64.0 | 65.4 | 67.6 | 73.0 | 57.6 | 55.8 | 41.2 | 39.0 | 51.0 |
| 1919 ... | 31.5 | 32.6 | 41.6 | 48.4 | 58.2 | 68.4 | 70.0 | 67.2 | 63.2 | 60.4 | 44.0 | 29.2 | 51.2 |
| Aves. .. | 31.4 | 29.7 | 39.9 | 48.8 | 59.2 | 66.1 | 70.2 | 69.2 | 62.8 | 53.0 | 41.0 | 31.1 | 50.4 |

## Monthly Precipitation, Parsons, W. Va.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept | Oct | Nov | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1899 . | 4.25 | 4.24 | 5.70 | 3.00 | 6.93 | 3.47 | 4.63 | 2.37 | 3.95 | 1.10 | 1.75 | 1.22 | 42.61 |
| 1900 . | 1.90 | 3.75 | 3.00 | 2.05 | 1.70 | 5.90 | 3.70 | 3.10 | 0.50 | 2.50 | 4.00 | 3.00 | 35.10 |
| 1901 . | 2.60 | 1.10 | 0.90 | 2.50 | 2.50 | 3.37 | 3.50 | 5.10 | 1.90 | 0.75 | 1.75 | 7.50 | 33.47 |
| 1902 . | 2.80 | 1.62 | 5.60 | 4.00 | 2.90 | 3.00 | 3.30 | 1.30 | 3.43 | 0.90 | 2.60 | 6.25 | 37.70 |
| 1903 . | 2.80 | 6.30 | 4.00 | 3.90 | 2.56 | 10.70 | 3.75 | 3.25 | 2.46 | 3.04 | 2.17 | 2.05 | 46.98 |
| 1904 . | 3.65 | 3.52 | 4.60 | 3.44 | 4.46 | 3.84 | 1.83 | 1.23 | 2.77 | 2.91 | 0.66 | 4.40 | 37.31 |
| 1905 . | 4.12 | 3.10 | 4.87 | 2.63 | 4.70 | 4.27 | 5.66 | 3.33 | 2.47 | 5.78 | 2.96 | 1.57 | 45.46 |
| 1906 . | 4.40 | 2.55 | 6.16 | 5.41 | 2.09 | 4.02 | 3.32 | 7.50 | 4.41 | 3.43 | 2.00 | 5.26 | 50.55 |
| 1907 . | 8.33 | 4 16 | 6.20 | 4.14 | 4.75 | 5.42 | 11.82 | 2.00 | 3.00 | 3.79 | 4.50 | 4.80 | 62.91 |
| 1908 . | 5.76 | 5.47 | 4.75 | 5.55 | 9.33 | 3.53 | 2.60 | 2.69 | 0.81 | 0.40 | 0.99 | 2.61 | 44.49 |
| 1909 . | 5.22 | 3.37 | 4.64 | 5.98 | 1.80 | 7.13 | 5.88 | 5.10 | 7.22 | 4.35 | 0.70 | 4.19 | 55.58 |
| 1910 . | 9.01 | 2.20 | 0.98 | 2.97 | 4.87 | 11.27 | 3.89 | 0.92 | 2.18 | 1.50 | 2.35 | 5.15 | 47.29 |
| 1911 . | 9.73 | 2.45 | 3.54 | 5.58 | 2.60 | 8.25 | 1.68 | 8.45 | 4.50 | 5.09 | 1.81 | 3.25 | 56.84 |
| 1912 . | 4.05 | 3.85 | 5.70 | 2.95 | 4.21 | 8.98 | 14.02 | 4.45 | 5.61 | 1.29 | 2.26 | 2.81 | 60.18 |
| 1913 . | 5.72 | 2.70 | 3.89 | 3.18 | 6.46 | 4.18 | 9.95 | 3.46 | 3.05 | 6.00 | 7.50 | 2.50 | 58.59 |
| 1914 . | 3.75 | 3.16 | 5.45 | 5.80 | 1.05 | 3.89 | 4.95 | 4.83 | 1.43 | 2.61 | 1.15 | 7.11 | 45.18 |
| 1915 . | 5 54 | 4 34 | 3.20 | 2.76 | 4.28 | 1.75 | 4.60 | 3.95 | 4.75 | 3.05 | 3.26 | 3.87 | 45.35 |
| 1916 . | 3.20 | 4.23 | 4.09 | 4.33 | 3.58 | 5.78 | 4.28 | 6.05 | 3.46 | 0.99 | 1.58 | 3.06 | 44.63 |
| 1917 . | 5.23 | 3.77 | 3.53 | 2.39 | 5.13 | 4.58 | 3.45 | 5.22 | 1.96 | 4.21 | 0.87 | 1.05 | 41.39 |
| 1918 . | 4.40 | 5.28 | 3.17 | 4.67 | 4.64 | 2.86 | 1.81 | 3.39 | 3.00 | 1.99 | 2.10 | 4.62 | 41.93 |
| 1919 . | 2.13 | 1.79 | 1.60 | 2.20 | 2.75 | 2.90 | 5.10 | 3.55 | 2.47 | 6.98 | 4.12 | 3.79 | 39.38 |
| Aves. | 4 69 | 3.47 | 4.07 | 3.78 | 3.97 | 5.19 | 4.94 | 3.87 | 3.11 | 2.98 | 2.43 | 3.81 | 46.33 |

## Monthly Snowfall, Parsons, W. Va.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept | Oct | Nov | Dec. | Annual. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1899 .. | 3.0 | 21.0 | 2.8 | 0 | 0 | .... | .... | .... | .... | 0 | T | 4.0 | 30.8 |
| 1900 .. | = | 9.0 | 14.0 | 0 | 0 | .... | .... | .... | .... | 0 | = | = | —— |
| 1901 .. | 10.0 | 9.0 | 2.0 | 10.0 | 0 | .... | .... | .... | .... | 0 | 9.0 | = | —— |
| 1902 .. | 6.0 | 16.0 | 10.0 | = | 0 | .... | .... | .... | .... | 0 | 2.0 | = | —— |
| 1903 .. | 14.0 | 13.1 | = | = | = | .... | .... | .... | .... | 0 | 3.3 | 6.5 | —— |
| 1904 .. | 14.0 | 13.5 | 2.2 | 0.5 | 0 | .... | .... | .... | .... | T | 0.6 | 13.0 | 43.8 |
| 1905 .. | 27.0 | = | 3.0 | 8.0 | 0 | .... | .... | .... | .... | 0 | T | 6.5 | —— |
| 1906 .. | 7.0 | 18.0 | 12.5 | 2.0 | 0 | .... | .... | .... | .... | 4.0 | 5.0 | 4.7 | 53.2 |
| 1907 .. | 2.0 | 12.0 | 6.5 | 23.0 | 0 | .... | .... | .... | .... | 0 | T | 13.5 | 57.0 |
| 1908 .. | 34.5 | 33.0 | T | 1.0 | T | .... | .... | .... | .... | T | 5.0 | 9.2 | 82.7 |
| 1909 .. | 9.5 | 10.2 | 23.5 | 14.5 | 0 | .... | .... | .... | .... | T | T | 27.5 | 85.2 |
| 1910 .. | 28.0 | 13.0 | 2.0 | = | T | .... | .... | .... | .... | 0 | 7.0 | 38.0 | —— |
| 1911 .. | 6.0 | 8.0 | 11.0 | 6.0 | 0 | .... | .... | .... | .... | 0 | 5.0 | 3.0 | 39.0 |
| 1912 .. | 19.5 | 13.0 | 8.0 | T | 0 | .... | .... | .... | .... | T | T | 12.0 | 52.5 |
| 1913 .. | 11.0 | 8.5 | 8.0 | T | 0 | .... | .... | .... | .... | T | 25.0 | 6.5 | 59.0 |
| 1914 .. | 21.0 | 17.5 | 34.5 | 3.0 | 0 | .... | .... | .... | .. . | T | 1.0 | 12.0 | 89.0 |
| 1915 .. | 19.2 | 16.5 | 23.0 | 1.0 | 0 | .... | .... | .... | .... | 0 | 1.1 | 15.5 | 76.3 |
| 1916 .. | 8.0 | 16.0 | 7.5 | 8.0 | 0 | .... | .... | .... | .... | 8.0 | 0.5 | 7.0 | 55.0 |
| 1917 .. | 8.0 | 17.0 | 9.5 | 4.0 | 0 | .... | .... | .... | .... | T | 2.0 | 2.0 | 42.5 |
| 1918 .. | 19.0 | 7.0 | 1.0 | 14.0 | 0 | .... | .... | .... | .... | 0 | T | 12.4 | 53.4 |
| 1919 .. | 5.5 | 8.0 | 1.0 | T | 0 | .... | .... | .... | .... | 0 | 0 | 5.0 | 19.5 |
| Aves. | 13.6 | 14.0 | 9.0 | 5.3 | Trace | .... | .... | .... | .... | 0.6 | 3.3 | 11.0 | 55.9 |

**Population.**—The following table, taken from the United States Census returns for 1920, shows the population of Tucker County for the last four enumerations:

## Population of Tucker County.

| Minor Civil Division | 1920 | 1910 | 1900 | 1890 |
|---|---|---|---|---|
| Black Fork District, including Parsons City and Hambleton and Hendricks towns | 4,387 | 4,912 | 2,307 | 1,218 |
| Hambleton town | 488 | 1,300 | ...... | ...... |
| Hendricks town | 622 | 640 | 317 | ...... |
| Parsons city | 2,001 | 1,780 | 618 | ...... |
| Ward 1 | ...... | 713 | ...... | ...... |
| Ward 2 | ...... | 565 | ...... | ...... |
| Ward 3 | ...... | 502 | ...... | ...... |
| Clover District | 776 | 1,069 | 1,174 | 1,085 |
| Davis District, including Davis town | 2,618 | 2,707 | 2,712 | ...... |
| Davis town | 2,491 | 2,615 | 2,391 | 918 |
| Dry Fork District, including part of Laneville town | 1,643 | 2,992 | 1,414 | 930 |
| *Laneville town (part of) | 46 | 263 | ...... | ...... |
| Fairfax District, including Thomas town | 5,328 | 4,752 | 3,975 | 1,506 |
| Thomas town | 2,099 | 2,354 | 2,126 | 269 |
| Licking District | 701 | 674 | 681 | 563 |
| St. George District, including St. George town | 1,338 | 1,569 | 1,170 | 1,157 |
| St. George town | 150 | 245 | 152 | 316 |
| Totals for County | 16,791 | 18,675 | 13,433 | 6,459 |

* Laneville in Tucker and Randolph Counties, combined population 1920, 103; 1910, 333.

**Products.**—The principal animal products are horses, cattle, sheep, poultry, swine, bees, and mules, their value being in the order named.

The principal agricultural products are corn, hay, oats, buckwheat, potatoes, apples, wheat, cherries, and peaches.

The principal mineral and manufactured products are coal, lumber, paper pulp, leather, and miscellaneous wood products.

**Property Valuation.**—According to Hon. J. S. Darst, State Auditor, the following table shows the property valuation for Tucker for the last three years:

| | 1918. | 1919. | 1920. |
|---|---|---|---|
| Real Estate.................... | $ 7,350,620. | $ 7,287,230. | $ 7,318,830. |
| Personal Property............. | 3,974,460. | 3,784,740. | 3,846,840. |
| Public Service Corporations.... | 1,691,721. | 1,669,751. | 1,617,107. |
| Totals .................. | $13,016,801. | $12,741,721. | $12,782,777 |

A comparison of the above figures with those for other counties in the Auditor's Report shows that Tucker ranks 37th in point of wealth in the State.

**Postal Service.**—Tucker County is served partly by the railway mail service and partly by star route and rural free delivery carriers, there being three rural routes, all of which start at St. George. The following table, compiled from information furnished by T. A. Wamsley, Postmaster of Parsons, shows the number of post-offices in the county:

| | | |
|---|---|---|
| Albert | Hambleton | Pierce |
| Benbush | Hendricks | Porterwood |
| Coketon | Jenningston | Red Creek |
| Davis | Laneville | St. George |
| Elk | Lead Mine | Shafer |
| Gladwin | Moore | Thomas |
| | Parsons | |

## TOWNS AND INDUSTRIES.

### Parsons.

Parsons, the county-seat of Tucker, named in honor of the well-known Parsons family, was incorporated as a city in 1907, its population according to the Census returns for 1920 being 2,001. Its growth and development began with the completion of the Western Maryland Railway through Tucker County in 1889, the county government having been moved from St. George to Parsons by special election held April 28, 1893, according to W. K. Pritt, of Parsons. Situated partly on the low flood-plain of Cheat River at the intersection of Shavers and Dry Forks, with an elevation of 1650 feet above sea-level, and partly on broad river terraces at slightly higher levels, and surrounded by towering, forest-clad mountains, the city of Parsons, with its broad streets, well-paved sidewalks, beautiful homes, and great industrial plants, presents a scene of rare charm and beauty that can scarcely be duplicated elsewhere in the State. Aside from its position as a natural supply point for the northern and western portions of the county, and in addition to the county business, which is considerable, it has two large manufacturing industries that rank favorably with others of their class throughout the State.

**Parsons Pulp and Lumber Company.**—The Parsons Pulp and Lumber Company, located on Shavers Fork in the southeastern section of Parsons, was first established in 1900 as the Parsons Pulp and Paper Company, but was reorganized under its present name in 1909 or 1910, its head office being at 1807 Finance Building, Philadelphia, Pennsylvania. According to J. B. Wilt, Superintendent, this concern manufactures chemical or bleached sulphite pulp for use in paper manufacture, and also lumber, its pulp capacity being 45 tons for each 24 hours. The equipment includes 2 digesters, 1 wet machine, 1 100-inch dry machine, the boiler capacity being 2,000 H. P., requiring 90 tons of coal per day. The soft wood, largely spruce and hemlock, used for the manufacture of pulp, comes partly from the local market and partly from the lumber mill of the company at Horton, Randolph County. Sulphur is obtained from Louisiana, chloride of lime from Michigan, and dolomitic limestone, of which 200 tons are required monthly, comes partly from Pennsylvania and partly from Maryland. Coal is obtained from the Roaring Creek region of Randolph County. The plant employs 150 men, of which 50 are classed as skilled laborers, the monthly pay-roll amounting to $15,000. The lumber output of the company is confined to its plant at Horton.

**J. K. Mosser Company.**—The J. K. Mosser Company, a subsidiary, since 1914, of the Armour Leather Company, the head office of which is at 175 Franklin Street, Chicago, Illinois, is situated on the east side of Cheat River at the northern end of Parsons, having been established in 1893. According to L. H. Perry, Superintendent, this concern manufactures heavy oak sole leather, its capacity being 700 sides per day, 110 days being required to complete the tanning process. The output of the plant goes to the general leather trade. Standard tanning processes are used throughout, the power equipment including 3 gas engines and a 500-H. P. boiler, 150 tons of coal from the Roaring Creek region of Randolph County being required weekly. Raw hides are obtained partly from the packing plants of the West and partly from the Argentine Republic. Local West Virginia oak and hemlock bark, together with chestnut wood and chestnut extract, are used, certain of the solutions being made at the plant, while the various tropical barks, roots, and herbs required in the process are obtained from foreign countries. The plant employs 140 men, of whom 100 are classed as skilled laborers, the monthly pay-roll being $12.000.

### St. George.

St. George, located on the east side of Cheat River, ten miles below and northward from Parsons, by county road measurement, was established as the county-seat coincident with the formation of Tucker County in 1856, having been named in honor of St. George Tucker, who was at that time Clerk of the Virginia House of Delegates. According to Lewis[4] the first settlement was made on the townsite by John Minear in 1776. In 1893 the county-seat was removed to Parsons, since which date the town of St. George has made little progress or increase in population, the Census returns for 1920 crediting it with 150 persons. The old court-house of early days, scarcely larger than a medium-sized dwelling, still stands in the village, its crumbling walls being almost entirely obscured by a grove of tall pines. The present business of St. George is almost wholly confined to that of supplying the needs of the rural population surrounding it.

### Hambleton.

Hambleton, situated along the Western Maryland Railway on the north side of Dry Fork of Cheat River, one mile west of the junction of the latter stream with Blackwater River, was incorporated as a town in 1905, having been known as Hulings during its earlier history. It was formerly an important industrial community devoted to the manufacture

[4]Virgil A. Lewis, History of West Virginia, p. 728; 1889.

of lumber and leather but all these plants have now been removed or destroyed by fire, leaving only a limited amount of railroad and local supply business. According to the Census returns for 1920 its population is 488.

### Hendricks.

Hendricks, situated along the Western Maryland Railway at the junction of Blackwater River and Dry Fork of Cheat River, at an elevation of 1721 feet above sea-level, and named in honor of Calvin Hendricks, was established as a town June 25, 1894, according to E. R. Mosser, Mayor, its population by the 1920 Census being 622. Its principal business at present is as a supply point for the Dry Fork territory served by the Central West Virginia and Southern Railroad, the shops and general offices of which road are located at Hendricks. Its manufacturing industry is confined to a single wood-working plant.

**Hendricks Handle Company.**—The Hendricks Handle Company, with office and works on the Central West Virginia and Southern Railroad at Hendricks, was established in 1911. According to N. P. Fankhouser, General Manager, the plant manufactures broom handles only. The equipment includes 3 broom lathes, a chucker and borer, hot air drying plant, Ricker-Bolter sawmill and rip-saw, power being supplied by one 50-H.P. and one 100-H.P. boiler and one 50-H.P. and one 75-H.P. engine, with an auxiliary dynamo for lighting the plant. Beech, birch, maple, hickory, and ash timber is used, coming mainly from Dry Fork of Cheat, most of the product being shipped to eastern points. The plant employes 12 men, of whom 3 are skilled laborers.

### Thomas.

Thomas, situated along the Western Maryland Railway on North Fork of Blackwater River, at an elevation of 2956 feet, named in honor of Thomas B. Davis, was incorporated as a town June 16, 1892, according to C. H. Shaffer, Town Sergeant, its population by the Census returns for 1920 being 2,099.

Its development and growth have been due mainly to the coal mining industry which centers about it, there being a large plant of this character in the middle of the town as well as numerous others within easy access of its population. It contains large administrative and technical offices of the Davis Coal and Coke Company, as well as an immense mercantile branch store of the Buxton and Landstreet Company, and also many well-built miners' homes, club houses, and recreation buildings and grounds, built and owned by the coal company. It is also an important railroad point, the towns of Davis, Pierce, and Benbush being closely connected by branch lines.

## Davis.

Davis, situated on the Blackwater River at the terminus of the Davis Branch of the Western Maryland Railway, at an elevation of 3101 feet above sea-level, and named in honor of the late Hon. Henry Gassaway Davis, through whose broad vision and great energy the railroad, mining, and lumber development of Tucker County mainly originated, was incorporated as a town in 1889, its population according to the Census returns for 1920 being 2491. Situated on a high mountain plateau, with an invigorating atmosphere even during the warm summer months, and being within easy access of delightful and picturesque mountain scenery, the town has for many years been a resort for numerous summer visitors. In its commercial aspect it is the supply point for the Canaan Valley as well as having large wood-working, mining, and other industrial establishments.

**Babcock Lumber and Boom Company.**—The Babcock Lumber and Boom Company, of Pittsburgh, Pennsylvania, has a large lumber and wood-working establishment at Davis, its control of the same dating from the year 1907, the plant having passed successively through the control of the Rumbarger Lumber Company, the Blackwater Boom and Lumber Company, and the Thompson Lumber Company. The Babcock Company, according to Edward Miller, Paymaster, manufactures both rough and finished hard

PLATE II.—View of Blackwater Falls (Same as Plate I) showing both main cataract and rapids across Upper Connoquenessing Sandstone.

and soft-wood lumber, its No. 1 Mill, located on the north side of the Blackwater, having a daily capacity of 100,000 feet B. M., with two 8-foot and one 6-foot band saws, and its No. 2 Mill, located on the south side of the river, having a capacity of 25,000 feet, with one 8-foot band saw. In addition to its mills the company operates approximately 31 mines of standard gauge logging railroad, the same having been previously described on page 5, its present timber supply coming entirely from the Blackwater River drainage above Davis. The company employs 350 men, including its woods, railroad and mill operatives, of whom 75 to 100 are classed as skilled laborers. The product of the mills goes to the general trade.

**Union Tanning Company.**—The Union Tanning Company, with head office located at 17 Battery Place, New York City, maintains a large tannery on the north side of the Blackwater River at the west end of Davis. According to O. O. Smith, Superintendent, the company manufactures sole leather, its capacity being 400 sides daily, the product going to the general leather trade. In addition to the hides, hemlock bark and chestnut extract are used extensively in the tanning process. This concern employs 160 men, of whom 12 are classed as skilled laborers, the average monthly pay-roll being $6,000.

**West Virginia Pulp and Paper Company.**—The West Virginia Pulp and Paper Company, with chief office at 200 Fifth Avenue, New York City, maintains a mill at Davis, the same having been established in 1892. According to D. B. Landis, Superintendent, the Davis Mill manufactures sulphite pulp, its capacity being 50 tons daily. The equipment includes 2 digesters, 1 cylinder machine, 1 wet machine, and also an electrolitic plant for making chlorine for bleaching purposes. The power-house contains six 225-H. P. and thirteen 130-H. P. boilers, making a total of 3,040 horse-power. The supply of pulp wood comes mainly from the property of the company on the head of Shavers Fork of Cheat River in Randolph and Pocahontas Counties. Sulphur is obtained from Texas, lime from Pennsylvania, salt from New York State, and coal from the local mines about Davis. The company employs 195 men, of whom 30 are classed as skilled laborers, the monthly payroll varying from $15,000 to $20,000.

## Laneville.

The Town of Laneville, located on Red Creek of Dry Fork of Cheat River, and being partly in Tucker and partly in Randolph County, was incorporated as a town in 1909, its population according to the Census returns for 1920 being 102. In 1910 its population was 333, but since that time the lumber establishments, as well as the railroad line, have been removed. According to Mr. J. J. Judy, Postmaster, the town once contained a population of about 1,500 when the lumber operations were at their height of development.

## Villages.

Besides the six incorporated cities and towns described above there are numerous mining, lumber, and residential villages scattered throughout the county, of which the following list gives the more important ones, exclusive of post-offices having only one or two families, their populations being estimated by postmaster or other reliable parties, mining towns being printed in black-faced type and lumber towns with an asterisk (*).

### Tucker County Villages.

| Village. | Population. 1919. | Village. | Population. 1919. |
|---|---|---|---|
| Auvil | 50 | *Jenningston | 700 |
| **Benbush** | 500 | Lead Mine | 50 |
| Bretz | 100 | Moore | 60 |
| **Coketon** | 300 | **Pierce** | 1500 |
| **Douglas (Albert P. O.)** | 600 | *Porterwood | 150 |
| Flanagan Hill (Red Creek P. O.) | 60 | *Shafer | 100 |
| Gladwin | 50 | William | 30 |

# CHAPTER II.

## PHYSIOGRAPHY.

### PHYSIOGRAPHIC CHANGES.

In its geographic relations Tucker County belongs in the Cumberland Plateau, or Western Division, of the Appalachian Province, a general description of which may be found in various publications[1]. Its surface features are a continuation of land forms that occur and have been described in counties lying farther westward, the same being much accentuated by severe folding, and much influenced by the greatly varying types of rocks brought to the surface in different localities. The mountains and ridges of the county are the remains of a vast peneplain, commonly presumed to have been developed in early Cretaceous time when practically the whole surface of the Cumberland Plateau was reduced to an almost level condition. Subsequent elevation of the general surface has raised this old peneplain to a much higher level than it formerly occupied, and consequent stream erosion, much of which was in progress during the epoch of elevation, has cut great valleys through the ancient plain, until the sky-line alone, as formed by the higher ridges, is left as a reminder of this age long past. As the total elevation along the southeastern border of the plateau, next to the Alleghany Front, was much greater than in the region next to the Ohio River, a cross-section of the sky-line shows a gradual northwestward dip.

No certain evidence of the much older pre-Cretaceous Peneplain, that is known to have existed at an earlier time than the one described above, can be found in Tucker County, although it is barely possible that Bald Knob and Wiess Knob, near the southern end of Cabin Mountain, and Pointy Knob, at the junction of Canaan and Mozark Mountains, may be fragments of it.

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[1]See Darton and Taff, Piedmont Folio, No. 28, U. S. Geological Survey; 1895.

In the Appalachian Valley, farther east, there is a well-marked peneplain that developed subsequent to that of the Cretaceous Period described above. This latter epoch of leveling is supposed to have reached its maximum development in early Tertiary time, but in Tucker County apparently never attained a mature stage. Its influence can be noted in many of the short tributary ravines that flow into the major branches of Cheat River, the drainage basins of these rivulets showing an approach to base-leveled maturity near their heads but plunging abruptly down in the last quarter or half mile of their course. Some of these steep descents may be accounted for by hard sandstone ledges that hold up the valleys but most of them are evidently due to the Tertiary Uplift that revived the parent streams and caused rapid cutting that has not yet reached the heads of the tributaries. In the northwestern portion of the county this peneplain seems to be roughly evidenced by the comparatively low ridge summits on either side of Cheat River below Parsons, and in the eastern portion by the broad expanse of the Canaan Valley which may represent it.

In referring to the supposed age of the Cretaceous and other peneplains described above, the writer has followed the commonly accepted inferences of numerous writers on the physiography of the Appalachian Province. A recent publication by Shaw[2], however, disputes the conclusion that any of these peneplains could have been formed at such an early period and still remain in existence over such wide areas as they are known to cover, the opinion being expressed that none of them is earlier than Tertiary or perhaps mid-Tertiary time. Certain facts presented in the publication referred to seem to be well founded, but, unfortunately, little evidence is available on the western side of the Appalachian System in West Virginia because of the fact that Cretaceous and Tertiary sediments are entirely lacking along the Appalachian Basin north of the extreme southern portion of Kentucky, leaving no basis, other than mere conjecture, for estimating the supposed rate of degradation.

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[2]E. W. Shaw, Ages of Peneplains of the Appalachian Province; Bulletin, Geological Society of America, Volume 29, No. 3; September, 1918.

Evidence of a former base-leveled condition of the major drainage of the county is abundant. Numerous wide meanders, which must have been developed during the time of the Cretaceous Peneplain, and which have been preserved through all the subsequent cutting, are visible along Cheat River and on Shavers and Dry Forks. On the Blackwater River, however, similar conditions are not apparent, the course of the stream from its mouth to the head of the gorge three miles above Davis having no meanders of consequence, it being entirely possible that all of the former meanders, if such existed, have been entirely removed by the extremely rapid cutting that has formed the gorge. In the Canaan Valley above Davis the Blackwater is still maturely base-leveled, with numerous short meanders and a scarcely perceptible fall, a condition which may be due largely to the influence of the Tertiary epoch of peneplanation. The somewhat moderate rate of fall of Cheat River below Parsons, as well as its wide, U-shaped valley, indicates that this portion of the county is again approaching a base-leveled condition, although well nigh countless years must elapse before the mountains will be reduced to a peneplain.

In the western portion of the county there is no evidence to indicate that the major folds of the strata have influenced the course of any important streams, as the Etam Anticline cuts squarely across the tributaries of Cheat River, and the Hannahsville and Leadmine Synclines, as well as the Deer Park and Parsons Anticlines pass diagonally across the river itself without any perceptible deflection of its course. In the eastern part of the county, however, the structure has a more marked influence, the North Fork of Blackwater River closely following the North Potomac Syncline, and the Blackwater Anticline being parallel or nearly in line with the courses of the Little Blackwater and Blackwater Rivers through the Canaan Valley.

Only a few instances of diverted stream channel and stream capture may be noted. On Cheat River near Auvil it appears quite certain that the channel of the stream once followed the present course of Clay Run to the present source of Laurel Run, returning to its present position via the bed of the latter tributary, but at some subsequent period has cut through the intervening neck of land, shortening its channel nearly two miles. At the head of the Canaan Valley the waters of Big Run of Dry Fork are rapidly cutting into the soft shales and limestone of the valley and seem destined to capture a portion of the Blackwater drainage. The waters of a branch of Red Creek have also scoured out a low divide south of the Harr School, isolating a portion of the Cabin Mountain from the parent range, and threatening to capture a portion of the Blackwater drainage.

## DRAINAGE BASINS.

### TABLE OF STREAM DATA.

The following table, prepared by R. C. Tucker, gives a list of the principal streams of Tucker County, their lengths being divided into sections, usually between large tributaries, and the rate of fall and length, both actual stream measurement and air-line distances, being determined. The last column shows the ratio between the total distance (T. D.) and the air-line distance (A. L. D.). Those having the greatest ratio are usually streams that have more nearly reached base-level at some period of their history, while others have apparently preserved more direct courses or lost their ancient meanders:

Table of Stream Data.

| Streams. | Total Distance. Miles. | Total Fall. Feet. | Rate of Fall per mi. Feet. | Air-Line Distance. Miles. | Ratio T. D. to A. L. D. |
|---|---|---|---|---|---|
| Cheat River (portion in Tucker County) | 21.7 | 175 | 8.06 | 11.7 | 1.85 |
| Parsons to St. George | 10.2 | 95 | 9.31 | 4.3 | 2.37 |
| St. George to Preston County Line | 11.5 | 80 | 6.96 | 7.4 | 1.55 |
| Licking Creek (entire) | 6.8 | 1150 | 169.12 | 4.7 | 1.45 |
| Source to Hovatter | 4.8 | 950 | 197.92 | 2.6 | 1.85 |
| Hovatter to mouth | 2.3 | 200 | 86.96 | 2.1 | 1.09 |
| Bull Run (entire) | 4.5 | 1525 | 338.89 | 4.3 | 1.05 |
| Source to Left Fork | 4.0 | 1485 | 371.25 | 3.9 | 1.02 |
| Left Fork to mouth | 0.5 | 40 | 80.00 | 0.4 | 1.25 |
| Minear Run (entire) | 7.5 | 1070 | 142.66 | 7.1 | 1.06 |
| Source to Jones Run | 3.8 | 750 | 197.37 | 3.6 | 1.06 |
| Jones Run to mouth | 4.0 | 320 | 80.00 | 3.4 | 1.18 |
| Clover Run (entire) | 11.1 | 1000 | 90.09 | 6.6 | 1.68 |
| Source to Valley Fork | 4.6 | 800 | 173.91 | 4.1 | 1.12 |

## Table of Stream Data—(Continued).

| Streams. | Total Distance. Miles. | Total Fall. Feet. | Rate of Fall per mi. Feet. | Air-Line Distance. Miles. | Ratio T. D. to A. L. D. |
|---|---|---|---|---|---|
| Valley Fork to Right Fork. | 5.0 | 130 | 26.00 | 3.8 | 1.32 |
| Right Fork to mouth..... | 1.5 | 70 | 46.66 | 1.3 | 1.15 |
| Right Fork (entire)........ | 5.5 | 730 | 132.73 | 4.7 | 1.17 |
| Horseshoe Run (entire)...... | 14.5 | 1090 | 75.17 | 10.5 | 1.38 |
| Source to Wolf Run.. ... | 6.5 | 825 | 126.92 | 4.6 | 1.41 |
| Wolf Run to Leadmine village ................ | 2.5 | 70 | 28.00 | 2.0 | 1.25 |
| Leadmine village to mouth | 5.5 | 195 | 35.45 | 5.0 | 1.10 |
| Wolf Run (of Horsehoe) (entire) ............... | 5.4 | 680 | 125.92 | 4.4 | 1.23 |
| Mill Run (entire)............. | 4.6 | 1825 | 396.73 | 3.8 | 1.21 |
| Shavers Fork (Pettit to mouth) | 9.0 | 180 | 20.00 | 6.3 | 1.43 |
| Haddix Run (entire)...... | 5.5 | 450 | 81.81 | 5.0 | 1.10 |
| Laurel Run (entire)...... | 3.4 | 475 | 139.44 | 3.2 | 1.06 |
| Pheasant Run (entire)... | 3.8 | 725 | 190.79 | 2.5 | 1.52 |
| Dry Fork (Red Creek to mouth) | 22.8 | 525 | 23.03 | 13.7 | 1.66 |
| Red Creek to Laurel Fork. | 4.6 | 105 | 22.83 | 2.1 | 2.19 |
| Laurel Fork to Glady Fork | 4.8 | 95 | 19.79 | 1.7 | 2.82 |
| Glady Fork to Hendricks.. | 9.0 | 215 | 23.89 | 6.0 | 1.50 |
| Hendricks to mouth...... | 4.4 | 110 | 25.00 | 3.9 | 1.13 |
| Elklick Run (entire) (at Hambleton)......... | 4.4 | 825 | 187.50 | 3.9 | 1.13 |
| Otter Creek (Randolph County Line to mouth). | 5.3 | 640 | 120.75 | 3.2 | 1.65 |
| Red Run (entire)........... | 7.5 | 1750 | 233.33 | 6.5 | 1.15 |
| Mill Run (entire)........... | 3.0 | 825 | 275.00 | 2.2 | 1.36 |
| Elklick Run (entire)........ (at Elklick)............. | 2.0 | 1100 | 550.00 | 1.9 | 1.05 |
| Glady Fork (Randolph County Line to mouth).. | 3.8 | 50 | 13.16 | 1.8 | 2.11 |
| Big Run (entire)........... | 3.0 | 1250 | 416.67 | 3.0 | 1.00 |
| Red Creek (entire)......... | 20.4 | 1840 | 90.19 | 16.3 | 1.25 |
| Source to Left Fork...... | 6.0 | 490 | 81.67 | 4.1 | 1.46 |
| Left Fork to Stonecoal Run | 4.0 | 750 | 187.50 | 2.8 | 1.43 |
| Stonecoal Run to Gandy Creek ................ | 3.2 | 125 | 39.03 | 2.4 | 1.33 |
| Gandy Creek to mouth... | 7.2 | 475 | 65.97 | 7.0 | 1.03 |
| Stonecoal Run (entire)..... | 4.0 | 975 | 243.75 | 3.5 | 1.14 |
| Blackwater River (entire)..... | 30.6 | 1545 | 50.49 | 23.3 | 1.31 |
| Source to Freeland Run... | 4.0 | 50 | 12.50 | 2.2 | 1.82 |
| Freeland Run to Sand Run | 5.4 | 50 | 9.26 | 4.3 | 1.26 |
| Sand Run to Little Blackwater ................. | 4.6 | 25 | 5.44 | 2.9 | 1.59 |
| Little Blackwater to Beaver Creek........... | 5.0 | 100 | 20.00 | 3.9 | 1.28 |
| Beaver Creek to North Fork | 4.6 | 625 | 135.87 | 3.5 | 1.31 |
| North Fork to Hendricks.. | 7.0 | 650 | 92.86 | 6.5 | 1.08 |
| North Fork (entire)........ | 7.4 | 650 | 87.83 | 6.2 | 1.19 |
| Source to Long Run....... | 6.4 | 275 | 42.97 | 5.3 | 1.21 |
| Long Run to mouth....... | 1.0 | 375 | 375.00 | 0.9 | 1.11 |

Table of Stream Data—(Continued).

| Streams. | Total Distance. Miles. | Total Fall. Feet. | Rate of Fall per mi. Feet. | Air-Line Distance. Miles. | Ratio T. D. to A. L. D. |
|---|---|---|---|---|---|
| Pendleton Creek (entire)... | 5.5 | 630 | 114.55 | 5.2 | 1.06 |
| Source to Western Maryland Railway........... | 4.7 | 220 | 46.81 | 4.5 | 1.04 |
| Western Maryland Railway to mouth............... | 0.8 | 410 | 512.50 | 0.7 | 1.15 |
| Beaver Creek (entire)...... | 12.0 | 400 | 33.33 | 10.2 | 1.18 |
| Source to Bench Mark 3111 | 6.5 | 325 | 50.00 | 5.5 | 1.18 |
| Bench Mark 3111 to mouth | 5.5 | 75 | 13.64 | 4.7 | 1.17 |
| Yellow Creek (entire)...... | 2.7 | 250 | 92.59 | 2.6 | 1.04 |
| Little Blackwater (entire).. | 5.2 | 175 | 33.65 | 3.8 | 1.37 |
| Glade Run (entire)....... | 3.8 | 95 | 25.00 | 2.9 | 1.31 |
| North Branch (entire)...... | 5.2 | 210 | 40.38 | 3.8 | 1.37 |
| Sand Run (entire).......... | 2.9 | 350 | 120.69 | 2.2 | 1.34 |
| Mill Run (entire)........... | 2.0 | 475 | 237.50 | 1.9 | 1.05 |

## AREAS OF DRAINAGE BASINS.

The following table, prepared by R. C. Tucker, gives a planimetric determination of the areas of the principal drainage basins of Tucker County, the joint topographic sheets of the United States and West Virginia Geological Surveys being used for authority:

Areas of Drainage Basins.

| Streams | Square Miles |
|---|---|
| Cheat River, entire above Preston County Line.............. | 868.25 |
| Licking Creek, entire.............................. | 6.53 |
| Bull Run, entire.................................. | 8.09 |
| Clover Run, entire................................ | 29.97 |
| Minear Run entire................................. | 11.77 |
| Horseshoe Run, entire.............................. | 56.77 |
| Mike Run....................................... | 3.89 |
| Maxwell Run.................................... | 3.95 |
| Hyle Run....................................... | 4.27 |
| Thunderstruck Run, entire......................... | 4.94 |
| Leadmine Run, entire............................. | 6.22 |
| Wolf Run, entire................................ | 7.84 |
| Mill Run........................................ | 5.70 |
| Shavers Fork, entire............................. | 210.44 |
| Haddix Run...................................... | 8.55 |
| Laurel Run...................................... | 3.37 |
| Pheasant Run.................................... | 7.73 |
| Dry Fork, entire................................ | 499.85 |
| Dry Fork, above Blackwater River.................. | 344.14 |
| Dry Fork, above Glady Creek....................... | 244.90 |
| Dry Fork, above Laurel Fork....................... | 182.71 |
| Elklick Run (at Hambleton)........................ | 6.19 |

### Areas of Drainage Basins.

| Streams. | Square Miles. |
|---|---|
| Otter Creek, entire | 26.14 |
| Red Run | 10.30 |
| Mill Run | 3.47 |
| Elklick Run (at Elklick) | 2.85 |
| Glady Fork | 68.00 |
| Big Run | 4.37 |
| Laurel Fork | 57.62 |
| Red Creek, entire | 68.36 |
| Blackwater River, entire | 141.77 |
| Blackwater River, above North Fork | 103.16 |
| Blackwater River, above Beaver Creek | 63.87 |
| North Fork | 18.24 |
| Pendleton Creek | 5.96 |
| Beaver Creek | 23.26 |
| Yellow Creek | 2.52 |
| Little Blackwater River | 16.26 |
| Glade Run | 6.32 |
| North Branch | 8.65 |

## DESCRIPTION OF DRAINAGE BASINS

### Cheat River.

Cheat River, which, with its tributaries, drains almost the entire area of Tucker County, is formed by the junction of Shavers and Dry Forks at Parsons. Its course from that point is generally northward to Albright, Preston County, where it veers northwestward and empties into the Monongahela River at Point Marion, Pennsylvania. Its elevation at Parsons is 1625 feet and at Point Marion 787 feet, the total fall throughout its length being 838 feet, or at the rate of 11.2 feet per mile. Its elevation at the Tucker-Preston County Line is 1450 feet, making a total fall of 175 feet in Tucker County, or at the rate of 8.13 feet per mile, the distance being 21.7 miles. Its entire length from Parsons to Point Marion is 75 miles. The area of its entire drainage basin is 1418 square miles and of that portion above the Preston County Line 868.25 square miles. Its course through Tucker County and through Preston as far as Rowlesburg is relatively placid but from Rowlesburg northward it is a turbulent stream with a high rate of fall per mile, its channel being littered with huge boulders from the sandstone cliffs that line a considerable portion of its steep and narrow valley. In Tucker there are wide meanders formed during the time of the supposed Cretaceous Peneplain, its valley at present being U-shaped for the most part, indicating a considerable advance toward another cycle of peneplanation. That portion of its valley in Tucker is largely covered by cut-over woodland, but on Shavers Fork in Randolph and Pocahontas Counties there is still a large area of virgin timber, tending much to preserve uniformity of flow.

Its principal tributaries in Tucker County, in ascending order, are Long Run, Licking Creek, Bull, Jonathan, Clay, Upper Jonathan, Clover, Minear, Horseshoe, Dry, Mill, and Wolf Runs.

A gaging station was established on Cheat River at the Moss Bridge, 2 miles below Parsons, August 24, 1912, by H. P. Drake, Engineer for the West Virginia Development Company, the gage height records beginning January 1, 1913, this company or the Pittsburgh Hydro-Electric Company having maintained the station until December 31, 1914. From January 1, 1915, to December 31, 1919, the United States Geological Survey was in charge, but since January 1, 1920, the West Virginia and United States Geological Surveys have kept the station in cooperation.

The published records of this station are given below, as taken from Water-Supply Papers Nos. 353, 383, 403, 433, and 453 of the United States Geological Survey, while those since 1917 are as given by G. C. Stevens, District Engineer, Water Resources Branch, United States Geological Survey:

### Cheat River near Parsons, W. Va.

**Location.**— At highway bridge, 3 miles below the confluence of Shavers and Dry Forks and 2 miles due north of Parsons W. Va

**Records available.**—Gage heights, January 1 to September 30, 1913. First discharge measurement made August 24, 1912.

**Drainage area.**—716 square miles (determined by West Virginia Development Company).

**Gage.**—Standard chain gage attached to bridge; gage read daily morning and evening to tenths. Limits of use; Half-tenths below 4.0 and tenths above 4.0.

**Control.**—Rocky; probably permanent.

**Discharge measurements.**—Made from downstream side of bridge.

**Winter flow.**—Discharge relation affected by ice during severe winters.

**Accuracy.**—Gage-height record probably reliable; data insufficient for estimates of discharge.

## Discharge Measurements of Cheat River near Parsons, W. Va., in the years ending September 30, 1912-13.

(Hydrographer, H. P. Drake, Engineer of the Pittsburgh Hydro-Electric Co.)

| Date. | Gage height. | Discharge. | Date. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1912. | Feet. | Sec.-Ft. | 1913. | Feet. | Sec.-Ft. |
| August 24......... | 2.93 | 704 | May 12......... | 2.57 | 494 |
| August 24......... | a2.93 | 708 | May 12......... | a2.57 | 496 |
| December 20...... | 2.60 | 454 | June 12......... | 3.02 | 811 |
| | | | June 12......... | a3.02 | 810 |
| | | | September 5.... | 2.06 | 198 |
| | | | September 5.... | a2.06 | 198 |

[a]Same soundings used as for other measurements on this date.

## Daily Gage Height, in Feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1913.

(O. C. Callihan, Observer).

| Day. | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|
| 1.............. | 4.4 | 4.1 | 4.2 | 4.3 | ..... | 3.6 | 2.9 | 3.25 | 2.25 |
| 2.............. | 4.2 | 3.85 | 3.85 | 3.9 | ..... | 3.5 | 2.9 | 2.9 | 2.15 |
| 3.............. | 5.6 | 3.9 | 3.7 | (a) | ..... | 3.45 | 2.8 | 2.8 | 2.15 |
| 4.............. | 5.1 | 5.1 | 3.6 | ..... | ..... | 3.35 | 2.95 | 2.6 | 2.05 |
| 5.............. | 5.6 | 4.7 | 3.5 | ..... | ..... | 3.2 | 3.05 | 2.45 | 2.05 |
| 6.............. | 6.4 | 4.1 | 3.3 | ..... | ..... | 3.2 | 3.35 | 2.5 | 2.05 |
| 7.............. | 7.1 | 3.65 | 3.3 | ..... | ..... | 3.65 | 3.2 | 2.35 | 2.25 |
| 8.............. | 9.8 | 3.15 | 3.15 | ..... | ..... | 3.9 | 2.85 | 2.4 | 2.6 |
| 9.............. | 7.4 | 3.0 | 3.15 | ..... | ..... | 3.65 | 2.8 | 2.3 | 2.55 |
| 10.............. | 5.6 | 3.15 | 3.7 | ..... | ..... | 3.35 | 7.5 | 2.25 | 2.3 |
| 11.............. | 5.0 | 4.2 | 5.2 | ..... | ..... | 3.2 | 5.5 | 2.7 | 2.2 |
| 12.............. | 6.4 | 4.7 | 5.2 | ..... | ..... | 2.95 | 3.9 | 3.0 | 2.1 |
| 13.............. | 5.8 | 4.0 | 5.4 | ..... | ..... | 2.8 | 4.4 | 6.9 | 2.0 |
| 14.............. | 4.8 | 3.5 | 6.8 | ..... | ..... | 2.75 | 5.8 | 5.5 | 2.0 |
| 15.............. | 4.3 | 3.2 | 6.4 | ..... | ..... | 2.7 | 5.2 | 3.95 | 2.0 |
| 16.............. | 4.2 | 3.05 | 5.4 | ..... | ..... | 2.6 | 4.0 | 3.4 | 1.95 |
| 17.............. | 4.0 | 3.35 | 4.6 | ..... | ..... | 2.5 | 5.4 | 3.0 | 2.05 |
| 18.............. | 4.4 | 3.75 | 4.4 | ..... | ..... | 2.35 | 5.6 | 2.85 | 3.25 |
| 19.............. | 4.2 | 4.4 | 4.4 | ..... | ..... | 2.2 | 4.4 | 2.85 | 3.0 |
| 20.............. | 3.95 | 4.6 | 4.4 | ..... | ..... | 2.15 | 3.6 | 2.85 | 2.7 |

## Daily Gage Height, in Feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1913—(Continued).

| Day. | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|
| 21 | 3.85 | 4.8 | 4.2 | ..... | ..... | 2.2 | 3.4 | 2.5 | 5.6 |
| 22 | 4.2 | 4.7 | 3.9 | ..... | ..... | 2.55 | 3.25 | 2.5 | 5.2 |
| 23 | 4.2 | 4.3 | 3.7 | ..... | ..... | 3.5 | 3.2 | 3.95 | 5.0 |
| 24 | 5.0 | 3.7 | 3.7 | ..... | ..... | 3.8 | 3.1 | 4.2 | 4.3 |
| 25 | 5.2 | 3.5 | 3.6 | ..... | ..... | 3.85 | 3.45 | 3.7 | 3.55 |
| 26 | 4.5 | 3.35 | 3.85 | ..... | ..... | 4.4 | 3.3 | 3.15 | 2.8 |
| 27 | 4.3 | 3.2 | 8.0 | ..... | ..... | 3.9 | 2.9 | 2.7 | 2.55 |
| 28 | 4.0 | 4.2 | 6.8 | ..... | ..... | 3.5 | 2.85 | 2.5 | 2.45 |
| 29 | 3.75 | ..... | 5.3 | ..... | ..... | 3.25 | 3.2 | 2.35 | 2.45 |
| 30 | 3.45 | ..... | 4.9 | ..... | ..... | 3.1 | 2.85 | 2.35 | 2.4 |
| 31 | 4.1 | ..... | 4.4 | ..... | (a) | ..... | 3.55 | 2.25 | ..... |

[a]Gage not read April 3—May 31, 1913.

NOTE.—Observer made no report concerning ice. Discharge relation probably not materially affected by ice during the year ending September 30, 1913.

The following data in regard to the gaging station are published on page 28 of Water-Supply Paper 383 in addition to information previously given on page 26 of this Report.

"**Regulation.**— A power plant on Dry Fork at Parsons may affect the flow during low water.

"**Accuracy.**—Gage heights may be in error due to the position of the graduations on the scale of the chain gage. The gage-height record for the year ending September 30, 1914, is therefore withheld from publication until additional information is obtained."

## Discharge Measurements of Cheat River near Parsons, W. Va., during the Year ending September 30, 1914.

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | Feet. | Sec.-ft. | | | Feet. | Sec.-ft. |
| Oct. 22 | H. P. Drake[a] | 4.69 | 3,470 | Nov. 9 | Peterson and Walters | 4.96 | 3,350 |
| Oct. 22 | H. P. Drake | 4.67 | 3,460 | Mar. 30 | H. P. Drake | 6.28 | 7,250 |

[a]Engineer of the West Virginia Development Co.

The following additional data regarding this gaging station are published on pages 30-31 of Water-Supply Paper 403:

"**Gage.**—Chain gage center of bridge on downstream guard rail; read twice a day, to quarter-tenths, by Mrs. E. C. Linger.

"**Extremes of Discharge.**— Maximum stage recorded during year, 13.0 feet at 7 a. m. January 7 (discharge, 24,700 second-feet); minimum stage, 1.6 feet at 6 p. m. November 11 (discharge, 60 second-feet).

"**Regulation.**—Some regulation above at various pulp mills and saw-mills. Effect probably compensating, so that two gage readings per day give correct basis for determining discharge.

"**Accuracy.**—Gage height records are reliable; the channel is fairly permanent, but the measuring section is poor. The results are believed to be reliable.

"The following discharge measurement was made by J. G. Mathers; November 25, 1914: Gage height, 2.25 feet; discharge, 217 second-feet."

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Years ending September 30, 1913-1915.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1913. | | | | | | | | | | | | |
| 1 .... | ..... | ...... | ..... | 2,350 | 1,890 | 2,040 | 2,190 | ..... | 1,290 | 618 | 910 | 235 |
| 2 .... | ..... | ...... | ..... | 2,040 | 1,600 | 1,600 | 1,740 | ..... | 1,180 | 618 | 618 | 195 |
| 3 .... | ..... | ...... | ..... | 4,500 | 1,670 | 1,410 | ...... | ..... | 1,120 | 545 | 545 | 195 |
| 4 .... | ..... | ...... | ..... | 3,560 | 3,560 | 1,290 | ...... | ..... | 1,010 | 655 | 415 | 160 |
| 5 .... | ..... | ...... | ..... | 4,500 | 2,840 | 1,180 | ...... | ..... | 865 | 735 | 330 | 160 |
| 6 .... | ..... | ...... | ..... | 6,290 | 1,890 | 960 | ...... | ..... | 865 | 1,010 | 358 | 160 |
| 7 .... | ..... | ...... | ..... | 8,040 | 1,350 | 960 | ...... | ..... | 1,350 | 865 | 280 | 235 |
| 8 .... | ..... | ...... | ..... | 15,300 | 820 | 820 | ...... | ..... | 1,670 | 580 | 305 | 415 |
| 9 .... | ..... | ...... | ..... | 8,790 | 695 | 820 | ...... | ..... | 1,350 | 545 | 258 | 385 |
| 10 .... | ..... | ...... | ..... | 4,500 | 820 | 1,410 | ...... | ..... | 1,010 | 9,650 | 235 | 258 |
| 11 .... | ..... | ...... | ..... | 3,380 | 2,040 | 3,740 | ...... | ..... | 865 | 4,300 | 478 | 215 |
| 12 .... | ..... | ...... | ..... | 6,290 | 2,840 | 3,740 | ...... | ..... | 655 | 1,670 | 695 | 178 |
| 13 .... | ..... | ...... | ..... | 4,910 | 1,740 | 4,110 | ...... | ..... | 545 | 2,350 | 7,540 | 145 |
| 14 .... | ..... | ...... | ..... | 3,020 | 1,180 | 7.290 | ..... | ..... | 510 | 4,910 | 4,300 | 145 |
| 15 .... | ..... | ...... | ..... | 2,190 | 865 | 6,290 | ...... | ..... | 478 | 3,740 | 1,740 | 145 |
| 16 .... | ..... | ...... | ..... | 2,040 | 735 | 4,110 | ...... | ..... | 415 | 1,740 | 1,060 | 130 |
| 17 .... | ..... | ...... | ..... | 2,670 | 1,010 | 2,670 | ...... | ..... | 358 | 4,110 | 695 | 160 |
| 18 .... | ..... | ...... | ..... | 2,350 | 1,470 | 2,350 | ...... | ..... | 280 | 4,500 | 580 | 910 |
| 19 .... | ..... | ...... | ..... | 2,040 | 2,350 | 2,350 | ...... | ..... | 215 | 2,350 | 580 | 695 |
| 20 .... | ..... | ...... | ..... | 1,740 | 2,670 | 2,350 | ...... | ..... | 195 | 1,290 | 580 | 478 |
| 21 .... | ..... | ...... | ..... | 1,600 | 3,020 | 2,040 | ...... | ..... | 215 | 1,060 | 358 | 4,500 |
| 22 .... | ..... | ...... | ..... | 2,040 | 2,840 | 1,670 | ...... | ..... | 385 | 910 | 358 | 3,740 |
| 23 .... | ..... | ...... | ..... | 2,040 | 2,190 | 1,410 | ...... | ..... | 1,180 | 865 | 1,740 | 3,380 |
| 24 .... | ..... | ...... | ..... | 3,380 | 1,410 | 1,410 | ...... | ..... | 1,540 | 778 | 2,040 | 2,190 |
| 25 .... | ..... | ...... | ..... | 3,740 | 1,180 | 1,290 | ...... | ..... | 1,600 | 1,120 | 1,410 | 1,230 |
| 26 .... | ..... | ...... | ..... | 2,510 | 1,010 | 1,600 | ...... | ..... | 2,350 | 960 | 820 | 545 |
| 27 .... | ..... | ...... | ..... | 2,190 | 865 | 10,400 | ...... | ..... | 1,670 | 618 | 478 | 385 |
| 28 .... | ..... | ...... | ..... | 1,740 | 2,040 | 7,290 | ...... | ..... | 1,180 | 580 | 358 | 330 |
| 29 .... | ..... | ...... | ..... | 1,470 | ...... | 3,920 | ...... | ..... | 910 | 865 | 280 | 330 |
| 30 .... | ..... | ...... | ..... | 1,120 | ..... | 3,200 | ...... | ..... | 778 | 580 | 280 | 305 |
| 31 .... | ..... | ...... | ..... | 1,890 | ...... | 2,350 | ...... | ..... | ..... | 1,230 | 235 | ..... |
| 1913-14 | | | | | | | | | | | | |
| 1 .... | 305 | 1,120 | 960 | 1,010 | 6,790 | 960 | 4,110 | ..... | ..... | 258 | 545 | 415 |
| 2 .... | 385 | 910 | 865 | 910 | 4,110 | 655 | 10,600 | ..... | ..... | 258 | 385 | 330 |
| 3 .... | 3,020 | 778 | 865 | 820 | 2,350 | 580 | 8,290 | ..... | ..... | 235 | 330 | 305 |
| 4 .... | 2,350 | 695 | 778 | 695 | 2,040 | 695 | 4,500 | ..... | ..... | 215 | 358 | 235 |
| 5 .... | 1,180 | 618 | 695 | 695 | 1,740 | 735 | 3,200 | ..... | ..... | 1,600 | 280 | 195 |

Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Years ending September 30, 1913-1915—Continued).

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 .... | 820 | 655 | 960 | 695 | 1,740 | 820 | 2,350 | ..... | ..... | 820 | 258 | 178 |
| 7 .... | 695 | 545 | 4,500 | 618 | 2,510 | 695 | 2,040 | ..... | ..... | 580 | 215 | 160 |
| 8 .... | 580 | 580 | 4,910 | 695 | 2,190 | 618 | 4,500 | ..... | ..... | 445 | 195 | 178 |
| 9 .... | 1,410 | 2,840 | 2,350 | ...... | 1,740 | 510 | 4,910 | ..... | ..... | 305 | 215 | 160 |
| 10 .... | 3,380 | 2,350 | 1,740 | ...... | 1,600 | 580 | 3,020 | ..... | ..... | 330 | 330 | 145 |
| 11 .... | 2,040 | 1,740 | 1,350 | ...... | 1,350 | 695 | ...... | ..... | ..... | 215 | 358 | 145 |
| 12 .... | 1,470 | 1,740 | 1,180 | ...... | 1,010 | 655 | ...... | ..... | ..... | 215 | 655 | 178 |
| 13 .... | 1,230 | 4,500 | 1,060 | ...... | 865 | 580 | ...... | ..... | ..... | 215 | 1,010 | 178 |
| 14 .... | 910 | 16,500 | 1,060 | ...... | 735 | 510 | ...... | ..... | ..... | 280 | 618 | 145 |
| 15 .... | 778 | 15,300 | 960 | ...... | 580 | 1,290 | ...... | ..... | ..... | 4,700 | 415 | 160 |
| 16 .... | 695 | 22,900 | 910 | ...... | 618 | 3,560 | ...... | ..... | ..... | 4,500 | 330 | 130 |
| 17 .... | 618 | 21,400 | 865 | ...... | 655 | 6,790 | ...... | ..... | ..... | 2,190 | 258 | 118 |
| 18 .... | 910 | 9,310 | 865 | ...... | 820 | 5,350 | ...... | ..... | ..... | 1,410 | 215 | 95 |
| 19 .... | 1,350 | 3,740 | 778 | ...... | 9,310 | 3,020 | ...... | ..... | ..... | 1,230 | 178 | 178 |
| 20 .... | 4,110 | 2,510 | 778 | 3,200 | 9,310 | 2,040 | ...... | ..... | ..... | 820 | 178 | 160 |
| 21 .... | 4,500 | 1,890 | 778 | 12,500 | 4,700 | 1,470 | ...... | ..... | ..... | 478 | 145 | 130 |
| 22 .... | 2,670 | 1,600 | 778 | 5,350 | 3,020 | 1,290 | 2,350 | ..... | ..... | 478 | 195 | 118 |
| 23 .... | 2,350 | 1,350 | 910 | 3,380 | 2,350 | 1,120 | 2,350 | ..... | ..... | 358 | 178 | 118 |
| 24 .... | 4,110 | 1,230 | 1,230 | 2,670 | 1,600 | 1,180 | 1,890 | ..... | ..... | 305 | 235 | 118 |
| 25 .... | 8,790 | 1,180 | 1,120 | 6,290 | 1,350 | 2,040 | 1,740 | ..... | ..... | 305 | 195 | 145 |
| 26 .... | 6,290 | 1,060 | 2,040 | 4,110 | 1,350 | 7,790 | 17,100 | ..... | ..... | 960 | 330 | 118 |
| 27 .... | 3,740 | 1,010 | 1,740 | 3,380 | 1,120 | 9,310 | ...... | ..... | ..... | 1,740 | 820 | 105 |
| 28 .... | 2,350 | 1,060 | 1,290 | 3,020 | 1,060 | 10,900 | ...... | ..... | ..... | 2,350 | 735 | 118 |
| 29 .... | 2,040 | 1,120 | 1,180 | 3,740 | ...... | 11,400 | ...... | ..... | ..... | 2,040 | 778 | 118 |
| 30 .... | 1,740 | 910 | 1,180 | 4,910 | ...... | 9,830 | ...... | ..... | ..... | 1,010 | 865 | 95 |
| 31 .... | 1,350 | ...... | 1,060 | 7,790 | ...... | 6,290 | ...... | ..... | ..... | 618 | 655 | ..... |
| 1914-15 | | | | | | | | | | | | |
| 1 .... | 95 | 235 | 271 | 1,470 | 15,900 | 1,230 | 136 | 1,060 | 2,840 | 207 | 403 | 1,290 |
| 2 .... | 78 | 305 | 1,010 | 778 | 22,600 | 566 | 330 | 735 | 2,670 | 231 | 427 | 820 |
| 3 .... | 70 | 215 | 1,290 | 960 | 10,100 | 910 | 640 | 695 | 3,740 | 305 | 2,190 | 695 |
| 4 .... | 95 | 195 | 1,120 | 1,120 | 5,810 | 695 | 1,540 | 484 | 2,120 | 305 | 778 | 655 |
| 5 .... | 95 | 160 | 1,010 | 1,230 | 3,920 | 610 | 1,350 | 458 | 1,540 | 244 | 695 | 580 |
| 6 .... | 130 | 160 | 1,600 | 1,540 | 1,960 | 595 | 1,180 | 330 | 1,230 | 380 | 403 | 735 |
| 7 .... | 118 | 178 | 1,540 | 20,200 | 2,430 | 552 | 2,510 | 248 | 1,230 | 368 | 305 | 820 |
| 8 .... | 118 | 160 | 1,540 | 6,290 | 2,840 | 504 | 2,040 | 211 | 1,410 | 305 | 262 | 538 |
| 9 .... | 130 | 178 | 1,600 | 2,840 | 2,840 | 838 | 1,540 | 184 | 910 | 336 | 248 | 588 |
| 10 .... | 145 | 160 | 1,740 | 2,430 | 2,840 | 167 | 3,200 | 160 | 735 | 285 | 341 | 497 |
| 11 .... | 178 | 70 | 1,820 | 2,120 | 3,020 | 148 | 2,840 | 151 | 735 | 258 | 285 | 400 |
| 12 .... | 178 | 130 | 1,890 | 2,190 | 2,840 | 157 | 3,200 | 385 | 552 | 397 | 262 | 358 |
| 13 .... | 118 | 178 | 2,040 | 2,190 | 2,840 | 215 | 2,840 | 397 | 531 | 415 | 2,270 | 320 |
| 14 .... | 178 | 195 | 1,670 | 2,590 | 2,670 | 341 | 2,510 | 271 | 3,920 | 315 | 865 | 271 |
| 15 .... | 305 | 230 | 1,600 | 2,840 | 2,840 | 231 | 2,270 | 219 | 2,670 | 258 | 1,960 | 244 |
| 16 .... | 445 | 235 | 1,470 | 3,020 | 2,670 | 1,120 | 2,120 | 174 | 1,540 | 223 | 1,350 | 215 |
| 17 .... | 735 | 910 | 1,350 | 5,810 | 2,670 | 1,120 | 1,540 | 151 | 2,270 | 573 | 2,670 | 184 |
| 18 .... | 820 | 618 | 1,470 | 13,600 | 2,350 | 778 | 1,350 | 142 | 1,290 | 504 | 3,740 | 588 |
| 19 .... | 618 | 478 | 1,600 | 18,500 | 1,540 | 478 | 865 | 128 | 910 | 380 | 1,670 | 4,500 |
| 20 .... | 478 | 580 | 4,500 | 12,200 | 1,120 | 397 | 552 | 271 | 545 | 524 | 820 | 2,350 |
| 21 .... | 358 | 655 | 7,290 | 7,290 | 865 | 325 | 439 | 484 | 415 | 595 | 1,230 | 1,410 |
| 22 .... | 258 | 545 | 3,740 | 6,050 | 655 | 167 | 363 | 559 | 504 | 778 | 1,670 | 1,230 |
| 23 .... | 178 | 545 | 2,840 | 6,290 | 497 | 154 | 580 | 4,910 | 504 | 504 | 1,470 | 471 |
| 24 .... | 145 | 545 | 2,120 | 6,290 | 820 | 133 | 531 | 2,350 | 363 | 421 | 1,120 | 244 |
| 25 .... | 253 | 195 | 1,820 | 4,910 | 6,050 | 148 | 385 | 1,290 | 266 | 380 | 1,060 | 167 |
| 26 .... | 235 | 160 | 1,670 | 4,110 | 5,350 | 154 | 262 | 1,060 | 258 | 325 | 695 | 133 |
| 27 .... | 258 | 151 | 1,410 | 3,020 | 4,910 | 271 | 207 | 910 | 276 | 258 | 1,670 | 380 |
| 28 .... | 215 | 136 | 1,180 | 1,540 | 1,740 | 188 | 346 | 778 | 240 | 227 | 1,410 | 320 |
| 29 .... | 178 | 211 | 1,290 | 1,350 | ...... | 148 | 1,540 | 1,060 | 207 | 219 | 2,040 | 253 |
| 30 .... | 215 | 142 | 3,020 | 1,120 | ...... | 181 | 1,350 | 4,300 | 207 | 484 | 3,560 | 223 |
| 31 .... | 258 | ...... | 2,840 | 1,670 | ...... | 157 | ...... | 4,910 | .... | 439 | 2,190 | ..... |

NOTE.—Discharge determined from a rating curve fairly well defined between 130 and 5,350 second-feet and poorly defined at other stages. Discharge January 9-19, 1914, estimated, because of ice, at 1,000 second-feet. Some ice was reported on the river February 13-18 and March 3-15, 1914; discharge for these periods may therefore be somewhat too high because of use of open-water rating curve.

## Monthly Discharge of Cheat River near Parsons, W. Va., for the Years ending September 30, 1913-1915.

(Drainage area, 716 square miles).

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area.) | Accuracy. |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square Mile. | | |
| **1913.** | | | | | | |
| January ...... | 15,300 | 1,120 | 3,620 | 5.06 | 5.83 | B. |
| February ..... | 3,560 | 695 | 1,740 | 2.43 | 2.53 | B. |
| March ....... | 10,400 | 820 | 2,840 | 3.97 | 4.58 | B. |
| June ........ | 2,350 | 195 | 934 | 1.30 | 1.45 | B. |
| July ......... | 9,050 | 545 | 1,800 | 2.51 | 2.89 | B. |
| August ...... | 7,540 | 235 | 995 | 1.39 | 1.60 | B. |
| September .... | 4,500 | 130 | 751 | 1.05 | 1.17 | B. |
| **1913-14.** | | | | | | |
| October ...... | 8,790 | 305 | 2,200 | 3.07 | 3.54 | B. |
| November .... | 22,900 | 545 | 4,100 | 5.73 | 6.39 | B. |
| December .... | 4,910 | 695 | 1,350 | 1.89 | 2.18 | B. |
| January ..... | 12,500 | .... | 2,500 | 3.49 | 4.02 | B. |
| February ..... | 9,310 | 580 | 2,450 | 3.42 | 3.56 | B. |
| March ....... | 11,400 | 510 | 3,030 | 4.23 | 4.88 | B. |
| July ........ | 4,700 | 215 | 1,010 | 1.41 | 1.63 | B. |
| August ...... | 1,010 | 145 | 402 | .561 | .64 | B. |
| September .... | 415 | 95 | 166 | .232 | .26 | B. |
| **1914-15.** | | | | | | |
| October ...... | 820 | 70 | 248 | .346 | .40 | B. |
| November .... | 910 | 70 | 297 | .415 | .46 | B. |
| December .... | 7,290 | 271 | 1,980 | 2.77 | 3.19 | B. |
| January ...... | 20,200 | 778 | 4,760 | 6.65 | 7.67 | B. |
| February ..... | 22,600 | 497 | 4,170 | 5.82 | 6.06 | B. |
| March ....... | 1,230 | 133 | 441 | .616 | .71 | B. |
| April ........ | 3,200 | 136 | 1,350 | 1.89 | 2.11 | B. |
| May ........ | 4,910 | 128 | 950 | 1.33 | 1.53 | B. |
| June ......... | 3,920 | 207 | 1,220 | 1.70 | 1.90 | B. |
| July ......... | 778 | 207 | 369 | .515 | .59 | B. |
| August ...... | 3,740 | 248 | 1,290 | 1.80 | 2.08 | B. |
| September .... | 4,500 | 133 | 716 | 1.00 | 1.12 | B. |
| The year . | 22,600 | 70 | 1,470 | 2.05 | 27.82 | |

B—Within 10 per cent.

The following data concerning the gaging records for this station for the year 1916 were published on pages 35-36 of Water-Supply Paper 433:

"**Gage.**—Chain gage near center of bridge on downstream guard rail; read by Mrs. E. C. Linger.

"**Extremes of Discharge.**—Maximum stage recorded during year. 13.05 feet at 7 a. m. January 12 (discharge, 24,900 second-feet); minimum stage. 1.36 feet at 6 p. m. November 1 (discharge. 46 second-feet.

"**Accuracy.**—Stage-discharge relation practically permanent, affected by ice in December, 1915. Rating curve fairly well defined between 130 and 5,500 second-feet. Beyond these limits the curve is an extension. Gage read twice daily to quarter tenths. Daily discharge ascertained by applying mean gage heights to rating table. Determination of discharge December 8 to 16 may be a little large, as correction for effect of ice on gage readings was not made. Results good".

## Discharge Measurements of Cheat River near Parsons, W. Va., during the year ending September 30, 1916.

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | Feet. | Sec.-ft. |
| March 25 | J. E. Stewart.................... | 4.71 | 2,770 |
| March 28 | J. E. Stewart.................... | 5.70 | 4,640 |
| Sept. 15 | L. Lee.............................. | 5.83 | 4,620 |

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1916.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 18,100 | 50 | 865 | 6,090 | 6,090 | 580 | 695 | 1,410 | 1,010 | 610 | 320 | 113 |
| 2 | 7,660 | 181 | 778 | 12,900 | 5,290 | 531 | 484 | 1,290 | 625 | 484 | 290 | 118 |
| 3 | 5,880 | 215 | 695 | 5,880 | 4,370 | 497 | 960 | 2,190 | 1,010 | 2,190 | 276 | 101 |
| 4 | 4,020 | 142 | 625 | 1,820 | 3,510 | 504 | 820 | 1,740 | 1,600 | 1,830 | 504 | 87 |
| 5 | 3,000 | 122 | 545 | 1,120 | 3,030 | 625 | 573 | 1,410 | 865 | 865 | 1,410 | 73 |
| 6 | 2,510 | 99 | 504 | 2,120 | 3,170 | 566 | 445 | 1,180 | 655 | 618 | 2,120 | 68 |
| 7 | 2,120 | 122 | 471 | 2,430 | 4,020 | 9,600 | 409 | 1,960 | 735 | 497 | 1,670 | 115 |
| 8 | 1,820 | 365 | 478 | 2,430 | 3,340 | 7,900 | 504 | 2,430 | 865 | 409 | 910 | 133 |
| 9 | 1,350 | 618 | 427 | 2,120 | 2,670 | 5,680 | 1,120 | 1,960 | 1,010 | 385 | 960 | 110 |
| 10 | 960 | 478 | 409 | 2,350 | 2,120 | 4,190 | 1,060 | 1,410 | 1,120 | 433 | 735 | 203 |
| 11 | 352 | 391 | 409 | 9,350 | 1,890 | 1,670 | 1,180 | 1,180 | 1,180 | 504 | 640 | 188 |
| 12 | 244 | 484 | 315 | 21,500 | 2,430 | 5,480 | 2,670 | 1,010 | 865 | 433 | 1,060 | 148 |
| 13 | 211 | 573 | 295 | 10,600 | 17,500 | 10,100 | 2,350 | 865 | 580 | 352 | 2,270 | 110 |
| 14 | 174 | 1,180 | 285 | 8,140 | 8,140 | 14,400 | 3,170 | 820 | 595 | 409 | 2,120 | 95 |
| 15 | 136 | 2,830 | 253 | 5,480 | 2,830 | 14,400 | 2,350 | 610 | 524 | 363 | 820 | 4,910 |
| 16 | 108 | 2,830 | 223 | 4,020 | 2,430 | 12,900 | 1,960 | 471 | 2,830 | 330 | 865 | 4,370 |
| 17 | 79 | 2,350 | 5,290 | 3,170 | 2,040 | 11,200 | 2,430 | 610 | 3,000 | 1,670 | 188 | 2,830 |
| 18 | 64 | 2,190 | 17,500 | 2,830 | 1,670 | 8,140 | 2,270 | 374 | 1,820 | 2,190 | 610 | 1,600 |
| 19 | 5,100 | 1,350 | 10,900 | 2,510 | 1,470 | 5,100 | 1,410 | 820 | 1,740 | 1,600 | 421 | 820 |
| 20 | 3,510 | 1,350 | 9,350 | 2,040 | 1,350 | 1,230 | 1,010 | 538 | 1,600 | 865 | 358 | 458 |

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1916—(Continued).

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 2,670 | 2,120 | 7,660 | 1,890 | 1,120 | 2,270 | 695 | 625 | 2,350 | 695 | 290 | 341 |
| 22 | 1,740 | 1,890 | 6,300 | 3,000 | 910 | 22,100 | 1,120 | 778 | 3,000 | 695 | 244 | 271 |
| 23 | 1,120 | 1,670 | 5,480 | 4,370 | 778 | 10,400 | 910 | 1,010 | 1,890 | 655 | 433 | 211 |
| 24 | 820 | 1,470 | 5,100 | 3,850 | 820 | 4,550 | 735 | 1,120 | 1,120 | 735 | 358 | 154 |
| 25 | 497 | 1,410 | 3,680 | 3,000 | 735 | 2,830 | 3,340 | 1,010 | 8,140 | 632 | 336 | 125 |
| 26 | 471 | 1,290 | 3,850 | 1,820 | 610 | 2,510 | 4,020 | 648 | 3,170 | 510 | 305 | 108 |
| 27 | 397 | 1,180 | 2,670 | 1,410 | 504 | 2,430 | 3,850 | 1,010 | 1,600 | 520 | 244 | 89 |
| 28 | 285 | 865 | 1,180 | 1,230 | 433 | 4,190 | 3,170 | 695 | 1,060 | 545 | 219 | 115 |
| 29 | 184 | 1,010 | 5,290 | 1,060 | 421 | 4,370 | 2,350 | 778 | 820 | 566 | 199 | 15,600 |
| 30 | 39 | 910 | 7,200 | 11,200 | ...... | 3,340 | 1,740 | 1,180 | 695 | 433 | 174 | 6,970 |
| 31 | 64 | ..... | 6,520 | 7,200 | ...... | 1,230 | ..... | 1,410 | ..... | 363 | 154 | ...... |

## Monthly Discharge of Cheat River near Parsons, W. Va., for the Year ending September 30, 1916.

(Drainage area, 716 square miles).

| Month. | Discharge in second-feet. | | | | Run-off (Depth in inches on drainage area) |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October .......... | 18,100 | 64 | 2,120 | 2.96 | 3.41 |
| November ......... | 2,830 | 50 | 1,070 | 1.49 | 1.66 |
| December ......... | 17,500 | 223 | 3,400 | 4.75 | 5.48 |
| January .......... | 21,500 | 1,060 | 4,800 | 6.70 | 7.72 |
| February .......... | 17,500 | 421 | 2,950 | 4.12 | 4.44 |
| March ............ | 22,100 | 497 | 5,660 | 7.91 | 9.12 |
| April ............. | 4,020 | 409 | 1,660 | 2.32 | 2.59 |
| May .............. | 2,430 | 374 | 1,110 | 1.55 | 1.79 |
| June .............. | 8,140 | 524 | 1,600 | 2.23 | 2.49 |
| July .............. | 2,190 | 330 | 756 | 1.06 | 1.22 |
| August ........... | 2,270 | 154 | 694 | 0.969 | 1.12 |
| September ......... | 15,600 | 68 | 1,350 | 1.89 | 2.11 |
| The year...... | 22,100 | 50 | 2,270 | 3.17 | 43.15 |

The following remarks concerning the records of this station during the year 1917 are taken from Water-Supply Paper 453, page 28:

"Gage........Read by Mrs. E. C. Linger.

"Extremes of Discharge.—Maximum stage recorded during year. 17.98 feet at 7 a. m. March 12 (discharge about 40,000 second-feet); minimum stage, 1.52 feet at 7 a. m. November 1 (discharge, 29 second-feet.

"Accuracy........Discharge December 10-22, 29-31, January 12-20, and February 2-17, may be somewhat large due to not correcting discharge for effect of ice on gage readings. Records fair except for those periods affected by ice, which are poor.

"The following discharge measurement was made by B. J. Peterson and B. L. Hopkins:

"September 25: Gage height, 1.88 feet; discharge, 74 second-feet."

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1917.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 ... | 5,480 | 865 | 310 | 2,670 | 1,600 | 4,550 | 820 | 1,290 | 3,000 | 290 | 207 | 262 |
| 2 ... | 4,020 | 552 | 240 | 4,370 | 1,180 | 4,190 | 865 | 960 | 2,590 | 300 | 207 | 231 |
| 3 ... | 2,830 | 452 | 163 | 5,880 | 960 | 3,680 | 820 | 865 | 1,890 | 253 | 207 | 120 |
| 4 ... | 1,060 | 363 | 127 | 7,660 | 960 | 3,340 | 517 | 1,060 | 1,350 | 215 | 155 | 43 |
| 5 ... | 433 | 262 | 93 | 13,200 | 865 | 2,830 | 1,010 | 1,120 | 1,120 | 187 | 191 | 32 |
| 6 ... | 363 | 203 | 117 | 10,400 | 778 | 2,350 | 1,960 | 865 | 865 | 187 | 248 | 35 |
| 7 ... | 310 | 175 | 85 | 6,090 | 865 | 2,430 | 2,350 | 695 | 910 | 240 | 207 | 695 |
| 8 ... | 325 | 330 | 152 | 5,100 | 695 | 6,520 | 2,040 | 1,010 | 865 | 235 | 330 | 3,680 |
| 9 ... | 320 | 258 | 191 | 4,190 | 820 | 7,200 | 1,540 | 865 | 778 | 253 | 559 | 910 |
| 10 ... | 300 | 385 | 148 | 3,340 | 655 | 5,680 | 1,670 | 778 | 2,040 | 187 | 510 | 865 |
| 11 ... | 271 | 305 | 102 | 2,510 | 566 | 11,200 | 2,670 | 695 | 2,120 | 187 | 330 | 439 |
| 12 ... | 227 | 310 | 70 | 1,670 | 552 | 35,900 | 2,430 | 618 | 1,960 | 187 | 248 | 315 |
| 13 ... | 195 | 320 | 65 | 1,120 | 484 | 15,900 | 2,120 | 820 | 1,600 | 171 | 207 | 266 |
| 14 ... | 159 | 276 | 58 | 1,060 | 421 | 10,900 | 1,740 | 820 | 1,180 | 300 | 191 | 235 |
| 15 ... | 271 | 253 | 330 | 910 | 421 | 10,600 | 1,540 | 735 | 910 | 203 | 183 | 199 |
| 16 ... | 2,040 | 227 | 330 | 1,060 | 484 | 8,860 | 1,350 | 640 | 778 | 409 | 144 | 171 |
| 17 ... | 3,850 | 244 | 231 | 865 | 497 | 7,200 | 1,230 | 588 | 595 | 458 | 105 | 215 |
| 18 ... | 3,340 | 203 | 820 | 1,120 | 655 | 6,300 | 1,350 | 545 | 380 | 910 | 90 | 144 |
| 19 ... | 3,000 | 163 | 2,270 | 1,120 | 1,010 | 5,680 | 1,290 | 478 | 290 | 820 | 82 | 90 |
| 20 ... | 4,190 | 141 | 2,270 | 960 | 3,850 | 5,100 | 1,180 | 427 | 203 | 510 | 63 | 80 |
| 21 ... | 6,300 | 148 | 1,890 | 1,540 | 4,020 | 6,740 | 960 | 421 | 148 | 865 | 54 | 65 |
| 22 ... | 5,290 | 195 | 1,890 | 32,700 | 2,590 | 6,090 | 778 | 433 | 124 | 478 | 47 | 248 |
| 23 ... | 4,370 | 421 | 2,190 | 9,600 | 2,190 | 5,100 | 573 | 439 | 93 | 695 | 42 | 102 |
| 24 ... | 3,850 | 1,120 | 1,670 | 1,670 | 3,000 | 3,850 | 497 | 820 | 510 | 458 | 99 | 88 |
| 25 ... | 3,340 | 910 | 1,180 | 1,410 | 2,590 | 3,340 | 415 | 655 | 341 | 655 | 72 | 78 |
| 26 ... | 2,830 | 778 | 865 | 1,180 | 3,000 | 3,170 | 397 | 566 | 244 | 1,290 | 49 | 68 |
| 27 ... | 2,510 | 573 | 2,830 | 960 | 4,730 | 3,680 | 439 | 8,380 | 735 | 1,060 | 35 | 56 |
| 28 ... | 2,190 | 545 | 4,020 | 820 | 5,480 | 2,830 | 865 | 8,860 | 497 | 625 | 54 | 271 |
| 29 ... | 1,820 | 504 | 3,680 | 1,010 | ..... | 2,190 | 1,540 | 15,300 | 695 | 510 | 102 | 735 |
| 30 ... | 1,470 | 391 | 2,670 | 960 | ..... | 1,600 | 1,230 | 5,880 | 655 | 403 | 258 | 1,120 |
| 31 ... | 1,120 | ..... | 1,010 | 1,740 | ..... | 1,230 | ..... | 4,370 | ..... | 248 | 305 | ..... |

## Monthly Discharge of Cheat River near Parsons, W. Va., for the Year ending September 30, 1917.

(Drainage area, 716 square miles).

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 6,300 | 159 | 2,200 | 3.07 | 3.54 |
| November | 1,120 | 141 | 396 | .553 | .62 |
| December | 4,020 | 58 | 1,030 | 1.44 | 1.66 |
| January | 32,700 | 820 | 4,160 | 5.81 | 6.70 |
| February | 5,480 | 421 | 1,640 | 2.29 | 2.38 |
| March | 35,900 | 1,230 | 6,460 | 9.02 | 10.40 |
| April | 2,670 | 397 | 1,270 | 1.77 | 1.98 |
| May | 15,300 | 421 | 2,000 | 2.79 | 3.22 |
| June | 3,000 | 93 | 982 | 1.37 | 1.53 |
| July | 1,290 | 171 | 445 | .622 | .72 |
| August | 559 | 35 | 180 | .251 | .29 |
| September | 3,680 | 32 | 395 | .552 | .62 |
| The year | 35,900 | 32 | 1,780 | 2.49 | 33.66 |

## Discharge Measurements of Cheat River near Parsons, W. Va., 1918-1920.

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | Feet. | Sec.-ft. |
| 1918 May 2 | B. L. Hopkins | 3.55 | 1,280 |
| 1920 May 19 | Peterson and Bigwood | 3 47 | 1,120 |
| June 19 | B. L. Bigwood | 3.47 | 1,100 |
| Nov. 15 | Bigwood and Lamoureux | 2.49 | 323 |

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1918.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 ... | 670 | 1,370 | 950 | ..... | 1,500 | 3,850 | 590 | 1,250 | 1,150 | 2,830 | 378 | 1,370 |
| 2 ... | 141 | 1,100 | 1,100 | ..... | 1,200 | 4,020 | 760 | 1,200 | 1,000 | 2,050 | 290 | 1,200 |
| 3 ... | 124 | 900 | 900 | ..... | 1,200 | 3,000 | 1,150 | 1,050 | 760 | 1,370 | 244 | 1,050 |
| 4 ... | 124 | 715 | 850 | ..... | 900 | 2,050 | 1,560 | 850 | 520 | 1,050 | 195 | 950 |
| 5 ... | 96 | 590 | 715 | ..... | 670 | 3,000 | 1,250 | 805 | 420 | 760 | 138 | 420 |
| 6 ... | 75 | 520 | 630 | ..... | 715 | 3,340 | 1,000 | 715 | 1,500 | 715 | 127 | 800 |
| 7 ... | 61 | 450 | 520 | ..... | 2,510 | 7,200 | 850 | 555 | 2,350 | 590 | 134 | 690 |
| 8 ... | 54 | 390 | 450 | ..... | 3,680 | 5,290 | 1,100 | 3,850 | 1,770 | 485 | 450 | 410 |
| 9 ... | 85 | 420 | ..... | ..... | 8,620 | 3,340 | 5,880 | 3,340 | 950 | 420 | 485 | 360 |
| 10 ... | 68 | 378 | ..... | ..... | 9,100 | 4,370 | 4,370 | 2,200 | 590 | 354 | 290 | 340 |
| 11 ... | 61 | 320 | ..... | ..... | 5,680 | 3,680 | 3,000 | 1,770 | 485 | 310 | 590 | 330 |
| 12 ... | 120 | 300 | ..... | ..... | 5,880 | 2,830 | 2,350 | 1,440 | 390 | 280 | 760 | 330 |
| 13 ... | 117 | 271 | ..... | ..... | 9,100 | 23,700 | 2,050 | 1,200 | 336 | 290 | 670 | 310 |
| 14 ... | 102 | 240 | ..... | ..... | 6,300 | 17,800 | 2,670 | 3,680 | 310 | 336 | 850 | 700 |
| 15 ... | 148 | 175 | ..... | ..... | 7,660 | 13,200 | 5,480 | 2,670 | 266 | 285 | 1,370 | 490 |
| 16 ... | 117 | 179 | ..... | ..... | 6,300 | 6,300 | 6,970 | 1,770 | 235 | 244 | 900 | 276 |
| 17 ... | 93 | 183 | ..... | ..... | 4,020 | 3,850 | 7,660 | 1,500 | 590 | 244 | 520 | 850 |
| 18 ... | 88 | 187 | ..... | ..... | 2,510 | 2,670 | 6,740 | 1,150 | 2,830 | 253 | 420 | 3,850 |
| 19 ... | 105 | 191 | ..... | ..... | 2,670 | 2,050 | 3,850 | 1,000 | 2,050 | 590 | 1,630 | 3,000 |
| 20 ... | 2,050 | 171 | ..... | ..... | 19,000 | 1,700 | 2,510 | 1,500 | 1,200 | 520 | 1,200 | 1,560 |
| 21 ... | 1,370 | 211 | ..... | ..... | 7,430 | 1,770 | 5,100 | 2,050 | 805 | 450 | 760 | 2,510 |
| 22 ... | 420 | 191 | ..... | ..... | 3,680 | 2,670 | 4,730 | 3,000 | 1,440 | 310 | 520 | 1,770 |
| 23 ... | 310 | 171 | ..... | ..... | 2,670 | 2,200 | 3,340 | 2,200 | 1,770 | 253 | 420 | 1,200 |
| 24 ... | 310 | 152 | ..... | ..... | 2,350 | 1,630 | 2,670 | 2,200 | 1,150 | 215 | 366 | 850 |
| 25 ... | 342 | 134 | 2,510 | ..... | 3,340 | 1,440 | 3,000 | 5,100 | 760 | 300 | 342 | 590 |
| 26 ... | 235 | 117 | 1,910 | 3,000 | 19,300 | 1,150 | 2,830 | 7,660 | 2,670 | 336 | 290 | 450 |
| 27 ... | 2,200 | 102 | 1,630 | 8,620 | 6,740 | 950 | 2,350 | 4,190 | 2,670 | 360 | 240 | 450 |
| 28 ... | 2,670 | 88 | 1,100 | 5,880 | 4,020 | 850 | 1,910 | 3,850 | 1,630 | 235 | 219 | 450 |
| 29 ... | 1,700 | 590 | 555 | 4,730 | ...... | 760 | 1,500 | 2,050 | 11,200 | 187 | 148 | 366 |
| 30 ... | 805 | 670 | 360 | 3,000 | ...... | 670 | 1,310 | 2,200 | 4,020 | 191 | 138 | 325 |
| 31 ... | 2,830 | ..... | 300 | 2,050 | ...... | 590 | ..... | 1,500 | ...... | 187 | 330 | ..... |

## Monthly Discharge of Cheat River near Parsons, W. Va., for the Year ending September 30, 1918.

(Drainage area, 716 square miles).

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October ........... | 2,830 | 54 | 571 | 0.797 | 0.92 |
| November ......... | 1,370 | 88 | 383 | .535 | .60 |
| December ......... | 2,510 | .... | 594 | .830 | .96 |
| January .......... | 8,620 | .... | 1,100 | 1.54 | 1.78 |
| February ......... | 19,300 | 670 | 5,310 | 7.42 | 7.73 |
| March ............ | 23,700 | 590 | 4,260 | 5.95 | 6.86 |
| April ............ | 7,660 | 590 | 3,020 | 4.22 | 4.71 |
| May .............. | 7,660 | 555 | 2,240 | 3.13 | 3.61 |
| June ............. | 11,200 | 235 | 1,590 | 2.22 | 2.48 |
| July ............. | 2,830 | 187 | 548 | .765 | .88 |
| August ........... | 1,630 | 127 | 497 | .694 | .80 |
| September ......... | 3,850 | .... | 942 | 1.32 | 1.47 |
| The year...... | 23,700 | 54 | 1,730 | 2.42 | 32.80 |

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Year ending September 30, 1919.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 ... | 305 | 5,100 | 1,560 | 13,500 | 750 | 4,190 | 1,150 | 1,000 | 295 | 900 | 760 | 285 |
| 2 ... | 300 | 3,170 | 1,150 | 26,600 | 800 | 3,170 | 760 | 1,630 | 420 | 715 | 520 | 231 |
| 3 ... | 276 | 2,050 | 1,050 | 14,100 | 900 | 2,050 | 850 | 1,370 | 450 | 555 | 420 | 199 |
| 4 ... | 253 | 1,560 | 950 | 10,400 | 590 | 1,770 | 1,100 | 1,100 | 420 | 420 | 366 | 175 |
| 5 ... | 215 | 1,250 | 850 | 5,880 | 590 | 1,770 | 850 | 950 | 372 | 300 | 295 | 250 |
| 6 ... | 290 | 1,050 | 760 | 4,020 | 520 | 4,370 | 590 | 760 | 330 | 253 | 715 | 200 |
| 7 ... | 305 | 850 | 950 | 2,510 | 485 | 2,830 | 850 | 590 | 290 | 290 | 805 | 190 |
| 8 ... | 171 | 715 | 1,310 | 1,630 | 590 | 2,670 | 900 | 1,200 | 384 | 195 | 630 | 190 |
| 9 ... | 138 | 590 | 1,700 | 1,310 | 850 | 2,200 | 850 | 3,510 | 354 | 152 | 485 | 210 |
| 10 ... | 187 | 590 | 12,300 | 1,050 | 630 | 2,200 | 760 | 6,970 | 280 | 378 | 348 | 200 |
| 11 ... | 300 | 520 | 13,800 | 850 | 390 | 2,050 | 805 | 5,100 | 244 | 3,170 | 384 | 150 |
| 12 ... | 440 | 450 | 9,100 | 715 | 520 | 1,310 | 1,630 | 3,340 | 195 | 2,200 | 450 | 179 |
| 13 ... | 630 | 420 | 4,020 | 670 | 520 | 900 | 1,250 | 2,670 | 144 | 850 | 315 | 191 |
| 14 ... | 555 | 390 | 3,510 | 485 | 850 | 900 | 1,050 | 2,050 | 195 | 1,200 | 555 | 152 |
| 15 ... | 378 | 366 | 2,830 | 390 | 950 | 950 | 1,000 | 1,440 | 342 | 1,500 | 390 | 124 |
| 16 ... | 305 | 336 | 2,350 | 320 | 760 | 1,000 | 1,100 | 1,250 | 1,910 | 14,400 | 305 | 120 |
| 17 ... | 235 | 354 | 2,050 | 330 | 520 | 1,050 | 1,560 | 1,910 | 2,050 | 7,200 | 258 | 120 |
| 18 ... | 191 | 630 | 1,700 | 520 | 630 | 1,910 | 1,700 | 1,770 | 1,560 | 2,830 | 231 | 130 |
| 19 ... | 141 | 1,500 | 1,500 | 4,910 | 520 | 2,050 | 1,500 | 1,500 | 1,150 | 1,910 | 248 | 150 |
| 20 ... | 163 | 1,700 | 1,150 | 2,830 | 590 | 1,440 | 1,310 | 1,310 | 900 | 6,520 | 179 | 110 |
| 21 ... | 630 | 1,440 | 805 | 1,100 | 670 | 950 | 1,050 | 1,910 | 715 | 6,740 | 262 | 110 |
| 22 ... | 520 | 1,150 | 1,200 | 1,200 | 1,310 | 760 | 900 | 2,050 | 555 | 4,730 | 342 | 200 |
| 23 ... | 450 | 805 | 4,300 | 1,000 | 3,000 | 850 | 850 | 1,500 | 372 | 3,850 | 342 | 400 |
| 24 ... | 366 | 630 | 3,400 | 6,520 | 2,200 | 850 | 2,050 | 1,250 | 384 | 1,910 | 390 | 700 |
| 25 ... | 1,000 | 590 | 2,400 | 2,830 | 1,910 | 715 | 1,910 | 1,630 | 1,000 | 1,250 | 276 | 1,000 |
| 26 ... | 1,370 | 520 | 1,560 | 1,560 | 3,680 | 555 | 1,050 | 1,500 | 2,050 | 850 | 203 | 500 |
| 27 ... | 1,000 | 384 | 1,370 | 1,100 | 2,350 | 850 | 900 | 1,100 | 2,350 | 630 | 179 | 200 |
| 28 ... | 760 | 1,000 | 1,250 | 950 | 1,500 | 2,670 | 805 | 805 | 2,050 | 555 | 203 | 152 |
| 29 ... | 950 | 3,680 | 1,560 | 1,100 | ..... | 3,170 | 760 | 630 | 1,440 | 420 | 130 | 130 |
| 30 ... | 3,340 | 2,350 | 2,830 | 1,000 | ..... | 2,350 | 715 | 485 | 1,050 | 330 | 138 | 110 |
| 31 ... | 6,520 | ..... | 5,880 | 850 | ..... | 1,630 | ..... | 354 | ..... | 420 | 175 | ... |

"NOTE.—Discharge Oct. 11-12, 25, Dec. 23-25, Jan. 22-23, 27-31, Feb. 1-3, July 14-15, Sept. 5-11, 16-27 and 29-30 estimated by comparison with records for Shavers Fork because of apparent error in observer's readings."

## Monthly Discharge of Cheat River near Parsons, W. Va., for the Year ending September 30, 1919.

(Drainage area, 716 square miles).

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October .......... | 6,520 | 138 | 732 | 1.02 | 1.18 |
| November ......... | 5,100 | 336 | 1,200 | 1.68 | 1.87 |
| December ......... | 13,800 | 760 | 2,940 | 4.11 | 4.74 |
| January .......... | 26,600 | 320 | 3,620 | 5.06 | 5.83 |
| February ......... | 3,680 | 390 | 1,060 | 1.48 | 1.54 |
| March ............ | 4,370 | 555 | 1,810 | 2.53 | 2.92 |
| April ............ | 2,050 | 590 | 1,090 | 1.52 | 1.70 |
| May .............. | 6,970 | 354 | 1,760 | 2.46 | 2.84 |
| June ............. | 2,350 | 144 | 808 | 1.13 | 1.26 |
| July ............. | 14,400 | 152 | 2,180 | 3.04 | 3.50 |
| August ........... | 805 | 130 | 364 | .508 | .59 |
| September ........ | 670 | ... | 235 | .328 | .37 |
| The year...... | 26,600 | ... | 1,490 | 2.08 | 28.34 |

## Daily Discharge, in second-feet, of Cheat River near Parsons, W. Va., for the Year ending, September 30, 1920.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 . | ..... | 1,560 | 1,400 | ...... | 1,000 | 1,050 | 760 | 10,900 | 390 | 354 | 420 | 590 |
| 2 . | ..... | 8,860 | 1,400 | ...... | 1,000 | ...... | 760 | 6,970 | 342 | 485 | 520 | 520 |
| 3 . | ..... | 7,660 | 630 | ...... | 590 | ...... | 630 | 4,910 | 320 | 1,770 | 485 | 485 |
| 4 . | ..... | 4,370 | 590 | ...... | 555 | ...... | 670 | 4,020 | 1,050 | 2,830 | 450 | 342 |
| 5 . | ..... | 3,170 | 715 | ...... | 485 | ...... | 850 | 3,340 | 2,830 | 1,770 | 390 | 215 |
| 6 . | ..... | 2,050 | 950 | ...... | 450 | ...... | 1,050 | 2,510 | 2,200 | 900 | 420 | 171 |
| 7 . | ..... | 1,310 | 19,300 | ...... | 420 | ...... | 1,150 | 1,910 | 1,370 | 760 | 485 | 148 |
| 8 . | ..... | 715 | 11,700 | ...... | 354 | ...... | 1,250 | 1,370 | 1,000 | 760 | 450 | 124 |
| 9 . | ..... | 520 | 6,970 | 15,900 | 290 | ...... | 1,370 | 950 | 715 | 590 | 280 | 127 |
| 10 . | ..... | 384 | 5,100 | 8,860 | ..... | ...... | 1,700 | 670 | 590 | 485 | 253 | 195 |
| 11 . | ..... | 450 | 4,190 | 5,290 | ..... | ...... | 1,500 | 555 | ..... | 805 | 390 | 271 |
| 12 . | 520 | 1,050 | 3,340 | 3,170 | ..... | 4,190 | 1,310 | 715 | ..... | 1,200 | 555 | 240 |
| 13 . | 1,310 | 950 | 2,670 | ...... | ..... | 12,900 | 3,000 | 2,500 | ..... | 900 | 805 | 203 |
| 14 . | 2,350 | 630 | 8,140 | ...... | ..... | 5,880 | 1,700 | 9,350 | ..... | 555 | 670 | 155 |
| 15 . | 6,090 | 520 | ...... | ...... | ..... | 3,680 | 1,370 | 6,740 | ..... | 590 | 715 | 117 |
| 16 . | 2,050 | 485 | ...... | ...... | ..... | 2,670 | 1,560 | 3,680 | 1,500 | 850 | 1,150 | 102 |
| 17 . | 1,630 | 420 | ...... | ...... | ..... | 11,700 | 2,510 | 2,050 | ..... | 850 | 1,770 | 134 |
| 18 . | 1,200 | 366 | ...... | ...... | ..... | 8,860 | 3,170 | 1,150 | ..... | 630 | 2,670 | 108 |
| 19 . | 1,100 | 336 | ...... | ...... | ..... | 16,500 | 3,680 | 1,050 | ..... | 485 | 3,340 | 93 |
| 20 . | 900 | 276 | ...... | ...... | ..... | 10,900 | 3,850 | 1,250 | ..... | 520 | 3,850 | 108 |
| 21 . | 670 | 248 | ...... | ...... | ..... | 5,480 | 14,700 | 1,370 | ..... | 520 | 3,170 | 124 |
| 22 . | 1,700 | 350 | ...... | 6,740 | ..... | 3,680 | 7,900 | 1,370 | 1,560 | 485 | 2,350 | 152 |
| 23 . | 2,670 | 350 | ...... | 14,100 | 4,020 | 2,670 | 8,380 | 1,050 | 1,440 | 450 | 2,670 | 134 |
| 24 . | 4,550 | 305 | ...... | 15,000 | 3,680 | 1,700 | 7,900 | 850 | 1,150 | 450 | 1,630 | 124 |
| 25 . | 3,680 | 450 | ...... | 9,100 | 3,170 | 1,440 | 6,300 | 760 | 900 | 5,290 | 1,250 | 148 |
| 26 . | 2,200 | 9,100 | ...... | 4,910 | 2,670 | 1,500 | 4,730 | 1,000 | 715 | 3,340 | 1,000 | 227 |
| 27 . | 4,550 | 5,100 | ...... | 3,680 | 2,350 | 2,200 | 4,730 | 760 | 520 | 670 | 850 | 342 |
| 28 . | 3,850 | 2,670 | ...... | 3,170 | 1,770 | 2,050 | 4,910 | 590 | 450 | 590 | 805 | 1,050 |
| 29 . | 2,200 | 1,400 | ...... | 2,670 | 1,370 | 1,370 | 4,370 | 555 | 390 | 520 | 715 | 1,500 |
| 30 . | 1,250 | 1,400 | ...... | 2,050 | ..... | 950 | 3,680 | 450 | 354 | 450 | 670 | 2,200 |
| 31 . | 900 | ..... | ...... | 1,370 | ..... | ...... | ...... | 420 | ..... | 390 | 630 | ..... |

"NOTE.—Discharge estimated because of ice Dec. 15 to 26 as 2,530 second-feet; Dec. 27-31 as 390 second-feet; Jan. 1-8 as 390 second-feet; Jan. 13-21 as 680 second-feet; Feb. 10-22 as 620 second-feet; and Mar. 2-11 as 1790 second-feet.

"Gage heights apparently in error and discharge estimated Oct. 1-11 as 210 second-feet; June 11-15 as 680 second-feet; June 17-21 as 620 second-feet and Nov. 22-23, 29-30, Dec. 1-2, Mar. 31, Apr. 1-2. 13, and May 13 as given in table."

## Monthly Discharge of Cheat River near Parsons, W. Va., for the Year ending September 30, 1920.

(Drainage area, 716 square miles).

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 6,090 | ...... | 1,540 | 2.15 | 2.48 |
| November | 8,860 | 248 | 1,920 | 2.68 | 2.99 |
| December | 19,300 | ...... | 3,210 | 4.48 | 5.16 |
| January | 15,900 | ...... | 3,400 | 4.75 | 5.48 |
| February | 4,020 | ...... | 1,110 | 1.55 | 1.67 |
| March | 16,500 | ...... | 3,870 | 5.41 | 6.24 |
| April | 14,700 | 630 | 3,380 | 4.72 | 5.27 |
| May | 10,900 | 420 | 2,440 | 3.41 | 3.93 |
| June | 2,830 | 320 | 876 | 1.22 | 1.36 |
| July | 5,290 | 354 | 1,010 | 1.41 | 1.63 |
| August | 3,850 | 253 | 1,160 | 1.62 | 1.87 |
| September | 2,200 | 93 | 348 | .486 | .54 |
| The year | 19,300 | 93 | 2,030 | 2.84 | 38.62 |

**Licking Creek.**—Licking Creek rises in Tucker County 1.7 miles southeast of the common corner of that county with Preston and Barbour, at an elevation of 2,650 feet, flows northwestward one mile, thence northeastward 1.5 miles, and thence generally eastward, emptying into Cheat River 1.5 miles southward from Hannahsville, at an elevation of 1,500 feet, its total length being 6.8 miles and its total fall 1,150 feet. The area of its drainage basin is 6.53 square miles. It has only a few short tributary branches. A considerable portion of the upland slopes on either side is still covered with partly virgin and partly cut-over woodland.

**Bull Run.**—Bull Run rises in Tucker County, 0.9 mile southeast of the common corner of that county with Preston and Barbour, at an elevation of 3,100 feet, flows southeastward and empties into Cheat River 1.5 miles north of Auvil, at an elevation of 1,550 feet, its total length being 4.5 miles and its total fall 1,150 feet. The area of its drainage basin is 8.09 square miles. Its principal tributary is Left Fork. Most of its upland slopes are still covered with virgin or cut-over woodland, the valley being devoted to agriculture and grazing.

**Clover Run.**—Clover Run rises in Tucker County 1.7 miles southwest of Texas, at an elevation of 2,525 feet, flows southeastward, thence eastward and northward, and empties into Cheat River just below St. George, at an elevation of 1,525 feet, its total length being 11.1 miles and its total fall 1,000 feet. The area of its drainage basin is 29.97 square miles. It divides into two large branches 1.3 miles above its mouth, known as Right and Left Forks, the latter being the parent stream. The principal tributaries above Right Fork are Indian Fork and Valley Fork. There is a considerable amount of cleared land, devoted to agriculture and grazing, both along its valley and on some of the ridges intervening between its branches, the intermediate slopes being largely covered with virgin or cut-over woodland.

**Minear Run.**—Minear Run rises in Tucker County one-half mile southwest of White, at an elevation of 2,600 feet, flows generally southwestward, and empties into Cheat River at St. George, at an elevation of 1,530 feet, its total length being 7.5 miles and its total fall 1,070 feet. The area of its drainage basin is 11.77 square miles. Its principal tributaries are Roaring, Jones, and Mill Runs, the latter being the parent stream. Grazing and agriculture within its watershed are largely confined to the ridges on either side, except in its lower valley below Jones Run, there being elsewhere a considerable proportion of virgin or cut-over woodland.

**Horseshoe Run.**—Horseshoe Run rises in Preston County 1.5 miles west of Eglon, at an elevation of 2,640 feet, flows generally southwestward and empties into Cheat River 2.5 miles southeast of St. George, at an elevation of 1,550 feet, its total length being 14.5 miles and its total fall 1,090 feet. The area of its drainage basin is 56.77 square miles. Its principal tributaries are Mike, Drift, Maxwell, and Hyle Runs, Lick Drain, Laurel, Lynn, Thunderstruck, Wolf and Twelvemile Runs. Its valley below Shafer is largely devoted to agriculture and grazing, the upland slopes and ridges, as well as several of its tributaries and its headwaters, being largely covered with virgin or cut-over woodland.

**Mill Run.**—Mill Run rises on the slope of Backbone Mountain, 3.5 miles south of Leadmine, at an elevation of

3,425 feet, flows first southwestward and thence northwestward, and empties into Cheat River 0.8 mile above Horseshoe Run, at an elevation of 1,600 feet, its total length being 4.6 miles and its total fall 1,825 feet. The area of its drainage basin is 5.70 square miles. Its watershed is almost entirely covered with cut-over woodland, there being a few cleared farms along the limestone belt near its source.

## Shavers Fork of Cheat River.

Shavers Fork of Cheat River rises in Pocahontas County 4.5 miles northwest of Cass, at an elevation of 4,500 feet, flows generally northward, through Randolph County and into Tucker, entering the latter 0.3 mile below Pettit, and finally joins with Dry Fork to form Cheat River just below Parsons, at an elevation of 1,625 feet. Its total length from head to mouth is 80.6 miles and its total fall 2,875 feet, the length in Tucker County being 9 miles and the fall in the same 180 feet. The area of its total drainage basin is 210.44 square miles and of that portion above the Tucker-Randolph Line 178.00 square miles. Throughout most of its course there are many ancient meanders developed during the time of the so-called Cretaceous Peneplain. There is a large amount of virgin timber on its watershed in Pocahontas and Randolph Counties, the remainder being largely covered with cut-over forest, there being only a comparatively few acres devoted to agriculture or grazing. Its principal tributaries in Tucker County are Sugarcamp, Hawk, Haddix, Jobs, Laurel, Pheasant, and Stonelick Runs.

A gaging station was established on Shavers Fork at Parsons October 14, 1910, by H. P. Drake for the Pittsburgh Flood Commission, which maintained the station until June 30, 1912. The United States Geological Survey maintained the station from July 1, 1912, to December 31, 1919, since which date it has been maintained in cooperation with the West Virginia Geological Survey, the records of which are published below, as taken from Water-Supply Papers Nos. 323, 353, 383, 403, 433, and 453 of the United States Geological Survey, while those since September 30, 1917, are as reported by G. C. Stevens, District Engineer, Water Resources Branch, United States Geological Survey.

Discharge measurements during 1913 by H. P. Drake as engineer of Pittsburgh Hydro-Electric Company and during 1914 as engineer of West Virginia Development Company. Observer, R. W. Evans from October 14, 1910, to date.

### Shavers Fork at Parsons, W. Va.

"**Location.**—At steel highway bridge 600 feet northwest of the railroad station at Parsons, W. Va., one-third mile above it confluence with Dry Fork.

"**Records available.**—October 14, 1910, to December 31, 1912. Established October 14, 1910, as a Pittsburgh Flood Commission station and was maintained by them until taken over by the United States Geological Survey July 1, 1912.

"**Drainage area**—210 square miles. (Pittsburgh Flood Commission).

"**Gage.**—Standard chain gage attached to bridge. Datum unchanged. The elevation above sea-level of the zero of the gage is 1,631.70 feet.

"**Channel.**—Rocky: probably permanent.

"**Discharge measurements.**—Made from downstream side of bridge or, at low stages, by wading.

"**Floods.**—High waters of 1888 and 1907 reached a height of approximately 12.5 feet referred to the present gage datum.

"**Point of zero flow.**—Levels run September 4, 1912, indicate that there would be no flow past the gage were the river to fall to a stage of 1.8 feet ± 0.2 foot.

"**Winter flow.**—Affected by ice during severe winters.

"**Accuracy.**—Most of the discharge measurements at this station were made by the subsurface method and the coefficients used in computing them vary from 0.88 to 0.95; measurements made this way are not considered by the Survey engineers to be as accurate as those made by the six-tenths or two-tenths and eight-tenths methods. Estimates of daily and monthly discharge are withheld from publication for the present because values computed from data now available appear to be excessive. The gage-height record is not thoroughly reliable as noted in the foot-note to the table of daily gage height. Anyone using these data should do so with caution and should campare any estimates of discharge made with those for other gaging stations in the locality and with records of precipitation".

## Discharge Measurements of Shavers Fork, at Parsons, W. Va., in 1910-1912.

| Date. | Hydrographer. | Gage height. | Dis-charge. | Date. | Hydrographer. | Gage height. | Dis-charge. |
|---|---|---|---|---|---|---|---|
| 1910. | | Feet. | Sec.-ft. | 1912. | | Feet. | Sec.-ft. |
| Oct. 14 | H. P. Drake[a]... | 2.89 | 76 | July 20 | H. P. Drake[a]... | 4.41 | [b]1,110 |
| | | | | July 20 | H. P. Drake[a]... | 4.37 | 1,070 |
| 1911. | | | | July 22 | H. P. Drake[a]... | 8.02 | [b]7,740 |
| Oct. 13 | H. P. Drake[a]... | 4.22 | 958 | Aug.22 | H. P. Drake[a]... | 3.32 | [b]193 |
| Dec. 12 | H. P. Drake[a]... | 3.40 | [b]312 | Aug.22 | H. P. Drake[a]... | 3.32 | [b]195 |
| | | | | Sept. 4 | C. T. Bailey.... | 3.05 | 117 |
| | | | | Dec. 24 | H. P. Drake[a]... | 3.18 | [b]144 |

[a]An engineer of the Pittsburgh Flood Commission.

[b]Velocity determined by subsurface method and coefficient used to reduce subsurface to mean velocity.

## Discharge Measurements of Shavers Fork at Parsons, W. Va., in the Year ending September 30, 1913.

(Hydrographer, H. P. Drake, Engineer of the Pittsburgh Flood Commission).

| Date. | Gage height. | Dis-charge. | Date. | Gage height. | Dis-charge. |
|---|---|---|---|---|---|
| 1912. | Feet. | Sec.-ft. | 1913. | Feet. | Sec.-ft. |
| December 24........ | 3.18 | 144 | | | |
| | | | June 12.......... | 3.36 | 256 |
| 1913. | | | June 12.......... | 3.36 | 259 |
| May 10............ | 3.23 | 176 | September 5...... | 2.78 | [a] 50 |
| May 10............ | 3.23 | 177 | September 5...... | 2.78 | [a] 52 |

[a]Measurement made by wading at a section about 300 feet above Western Maryland Railroad bridge.

## Daily Gage Height, in Feet, of Shavers Fork at Parsons, W. Va., for the Years ending September 30, 1911-1913.

(R. W. Evans, observer).

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1911[a] | | | | | | | | | | | | |
| 1 | .... | 2.97 | 4.54 | 3.90 | 5.78 | 3.06 | 3.94 | 3.62 | 3.60 | 3.38 | 2.76 | 4.64 |
| 2 | .... | 2.97 | 3.54 | 4.50 | 4.48 | 3.26 | 4.44 | 3.62 | 3.60 | 3.08 | 2.76 | 3.74 |
| 3 | .... | 3.07 | 3.54 | 5.90 | 4.18 | 3.26 | 4.54 | 3.42 | 3.60 | 2.78 | 2.96 | 3.54 |
| 4 | .... | 2.97 | 3.74 | 5.30 | 4.08 | 3.26 | 4.64 | 3.52 | 3.40 | 2.78 | 2.86 | 3.44 |
| 5 | .... | 2.97 | 3.54 | 4.70 | 3.88 | 3.26 | 6.24 | 3.62 | 3.40 | 2.78 | 2.76 | 3.34 |
| 6 | .... | 3.07 | 3.24 | 3.90 | 3.88 | 3.36 | 5.64 | 3.52 | 3.60 | 2.78 | 2.66 | 3.34 |
| 7 | .... | 2.97 | 3.24 | 3.70 | 3.78 | 4.56 | 5.64 | 3.42 | 3.80 | 2.68 | 1.86 | 3.14 |
| 8 | .... | 2.97 | 3.14 | 3.60 | 3.68 | 4.46 | 5.44 | 3.52 | 4.00 | 2.78 | 2.56 | 3.24 |
| 9 | .... | 2.97 | 2.94 | 3.50 | 3.88 | 2.96 | 5.24 | 3.42 | 3.90 | 2.78 | 2.66 | 2.94 |
| 10 | .... | 2.97 | 3.04 | 3.20 | 3.78 | 4.16 | 5.04 | 3.32 | 3.80 | 2.68 | 2.56 | 2.74 |
| 11 | .... | 2.97 | 3.14 | 3.20 | 3.68 | 4.06 | 4.84 | 3.02 | 3.90 | 2.88 | 2.46 | 3.74 |
| 12 | .... | 2.97 | 3.14 | 3.50 | 3.78 | 3.96 | 4.64 | 3.12 | 3.80 | 3.38 | 2.46 | 4.34 |
| 13 | .... | 2.97 | 3.14 | 7.20 | 3.48 | 4.46 | 4.84 | 3.02 | 3.80 | 3.18 | 2.36 | 3.74 |
| 14 | 2.89 | 2.77 | 2.94 | 6.50 | 3.48 | 4.96 | 5.04 | 3.12 | 4.00 | 3.08 | 2.46 | 3.74 |
| 15 | 2.89 | 2.97 | 2.94 | 5.50 | 3.38 | 5.26 | 5.64 | 3.22 | 3.90 | 2.98 | 2.56 | 2.84 |
| 16 | 2.80 | 2.97 | 2.94 | 5.60 | 3.38 | 5.06 | 4.74 | 2.92 | 3.80 | 2.98 | 2.66 | 6.74 |
| 17 | 2.89 | 2.77 | 2.94 | 4.50 | 3.48 | 3.96 | 4.44 | 3.02 | 3.70 | 2.98 | 2.66 | 5.44 |
| 18 | 2.89 | 2.87 | 2.94 | 4.10 | 3.58 | 3.86 | 4.44 | 2.92 | 4.40 | 2.78 | 2.56 | 4.34 |
| 19 | 2.80 | 2.87 | 3.14 | 3.90 | 3.48 | 4.06 | 4.04 | 2.82 | 4.00 | 2.88 | 2.56 | 3.74 |
| 20 | 2.89 | 2.87 | 3.04 | 3.80 | 3.68 | 4.66 | 4.64 | 2.82 | 4.00 | 2.68 | 2.56 | 3.94 |
| 21 | 2.89 | 2.77 | 2.94 | 3.60 | 3.58 | 4.46 | 4.84 | 2.92 | 3.80 | 2.78 | 2.66 | 4.04 |
| 22 | 2.89 | 2.87 | 3.04 | 4.50 | 3.48 | 4.36 | 5.04 | 2.82 | 3.80 | 2.78 | 2.66 | 3.94 |
| 23 | 3.10 | 2.87 | 3.14 | 4.50 | 3.28 | 4.06 | 4.84 | 1.92 | 3.70 | 2.98 | 2.86 | 3.84 |
| 24 | 3.20 | 2.87 | 3.74 | 4.40 | 3.28 | 3.96 | 4.24 | 2.62 | 3.80 | 2.88 | 2.66 | 3.74 |
| 25 | 3.00 | 2.97 | 3.74 | 4.60 | 3.08 | 3.86 | 4.04 | 2.62 | 4.00 | 2.78 | 2.86 | 3.74 |
| 26 | 3.00 | 3.77 | 3.54 | 4.80 | 3.28 | 3.56 | 4.14 | 2.72 | 3.80 | 2.78 | 2.56 | 3.84 |
| 27 | 3.00 | 3.57 | 3.24 | 5.70 | 3.28 | 3.46 | 4.04 | 4.22 | 4.00 | 2.78 | 2.46 | 3.94 |
| 28 | 3.00 | 3.67 | 3.24 | 5.60 | 3.18 | 3.46 | 3.84 | 4.02 | 3.80 | 2.68 | 2.66 | 4.04 |
| 29 | 3.03 | 4.87 | 3.84 | 5.30 | .... | 3.66 | 4.04 | 3.82 | 3.70 | 2.58 | 2.86 | 3.94 |
| 30 | 3.01 | 3.97 | 5.94 | 9.90 | .... | 3.86 | 3.64 | 3.72 | 3.40 | 2.68 | 2.96 | 3.74 |
| 31 | 3.00 | .... | 4.84 | 5.90 | .... | 4.06 | .... | 3.72 | .... | 2.88 | 6.36 | .... |
| 1912. | | | | | | | | | | | | |
| 1 | 5.72 | 3.20 | 3.90 | 5.4 | 4.2 | 5.4 | 5.0 | 3.2 | 3.0 | 3.4 | 4.1 | 3.4 |
| 2 | 5.12 | 3.40 | 3.90 | 5.0 | 4.1 | 5.4 | 5.1 | 3.1 | 3.1 | 3.3 | 3.2 | 3.3 |
| 3 | 4.72 | 3.30 | 3.80 | 4.9 | 3.6 | 5.2 | 4.9 | 3.2 | 3.0 | 3.3 | 3.3 | 3.2 |
| 4 | 4.72 | 3.20 | 3.70 | 4.6 | 3.2 | 5.0 | 4.6 | 3.2 | 3.1 | 4.8 | 3.3 | 3.01 |
| 5 | 4.62 | 3.10 | 3.80 | 4.3 | 3.2 | 4.8 | 4.5 | 3.1 | 3.0 | 4.4 | 3.2 | 3.02 |
| 6 | 4.32 | 4.20 | 3.60 | 4.0 | 3.0 | 4.7 | 4.6 | 3.4 | 2.1 | 4.3 | 3.1 | 3.01 |
| 7 | 4.72 | 5.50 | 3.40 | 4.0 | 3.0 | 5.0 | 4.2 | 3.5 | 3.1 | 4.2 | 3.2 | 2.81 |
| 8 | 5.32 | 4.20 | 3.50 | 3.6 | 3.1 | 5.2 | 4.1 | 3.4 | 3.0 | 3.1 | 3.2 | 2.81 |
| 9 | 4.72 | 4.60 | 3.40 | .... | 3.0 | 5.3 | 4.0 | 3.3 | 2.1 | 3.6 | 3.2 | 2.72 |
| 10 | 4.92 | 3.90 | 3.30 | .... | 3.1 | 5.4 | 4.2 | 4.0 | 2.8 | 3.3 | 3.1 | 2.10 |
| 11 | 5.02 | 3.80 | 3.20 | .... | 3.2 | 5.2 | 4.1 | 3.8 | 2.8 | 3.3 | 3.0 | 2.01 |
| 12 | 3.82 | 3.60 | 3.30 | .... | 3.3 | 5.3 | 3.6 | 7.0 | 2.8 | 3.3 | 3.0 | 2.02 |
| 13 | 4.22 | 3.50 | 3.40 | .... | 3.2 | 4.6 | 3.4 | 6.3 | 2.6 | 3.5 | 3.1 | 2.03 |
| 14 | 3.90 | 3.40 | 3.50 | .... | 3.1 | 4.8 | 3.5 | 6.0 | 2.8 | 3.4 | 3.0 | 2.02 |
| 15 | 4.10 | 3.40 | 3.60 | .... | 3.0 | 5.3 | 3.4 | 5.8 | 2.8 | 4.2 | 3.0 | 2.82 |
| 16 | 4.70 | 3.50 | 4.00 | .... | 3.1 | 7.3 | 3.3 | 6.1 | 2.8 | 4.0 | 3.1 | 3.00 |
| 17 | 4.00 | 3.40 | 4.60 | .... | 3.0 | .... | 3.6 | 5.9 | 2.9 | 4.0 | 3.0 | 3.02 |
| 18 | 7.40 | .... | 4.20 | .... | 3.2 | .... | 3.5 | 5.0 | 4.4 | 6.3 | 2.9 | 3.01 |
| 19 | 5.00 | .... | 4.30 | .... | 3.5 | .... | 4.0 | 4.6 | 4.5 | 6.0 | 3.0 | 2.90 |
| 20 | 4.60 | .... | 4.20 | 5.2 | 3.7 | .... | 4.0 | 4.0 | 4.6 | 4.4 | 3.1 | 3.02 |
| 21 | 4.20 | .... | 4.10 | 5.3 | 3.8 | .... | 3.8 | 3.7 | 3.1 | 4.0 | 3.3 | 3.00 |
| 22 | 4.50 | .... | 3.70 | 5.0 | 3.9 | 6.1 | 3.7 | 3.7 | 3.9 | 7.6 | 3.2 | 3.00 |
| 23 | 4.60 | .... | 4.00 | 5.1 | 4.3 | 5.7 | 3.6 | 3.6 | 4.0 | 6.6 | 3.6 | 3.22 |
| 24 | 4.40 | 3.70 | 4.20 | 5.0 | 4.4 | 4.8 | 3.4 | 3.5 | 4.0 | 5.0 | 3.4 | 4.80 |
| 25 | 4.00 | 3.60 | 4.60 | 4.9 | 4.6 | 4.7 | 3.5 | 3.4 | 3.0 | 8.0 | 3.2 | 5.00 |

**Daily Gage Height, in Feet, of Shavers Fork at Parsons, W. Va., for the Years ending September 30, 1911-1913—(Continued).**

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 4.00 | 3.50 | 5.00 | 4.8 | 6.1 | 4.7 | 3.6 | 3.2 | 3.1 | 4.2 | 3.4 | 4.05 |
| 27 | 3.50 | 3.60 | 5.10 | 4.6 | 7.4 | 4.6 | 3.4 | 3.4 | 3.9 | 4.4 | 3.6 | 4.05 |
| 28 | 3.40 | 3.40 | 5.00 | 4.5 | 6.5 | 5.0 | 3.5 | 3.1 | 3.7 | 4.0 | 3.4 | 3.82 |
| 29 | 3.30 | 3.30 | 4.90 | 4.8 | 5.6 | 5.2 | 3.6 | 3.2 | 3.9 | 3.9 | 3.3 | 3.55 |
| 30 | 3.40 | 3.40 | 4.60 | 5.1 | .... | 6.0 | 3.5 | 3.1 | 3.6 | 4.2 | 3.3 | 3.42 |
| 31 | 3.30 | .... | 5.00 | 4.8 | .... | 5.0 | .... | 3.1 | .... | 4.1 | 3.4 | .... |
| 1913. | | | | | | | | | | | | |
| 1 | 3.30 | 3.23 | 2.87 | 4.2 | 3.85 | 4.1 | 4.2 | 4.0 | 4.5 | 3.0 | 3.4 | 3.1 |
| 2 | 3.22 | 3.08 | 2.97 | 4.0 | 3.9 | 4.0 | 4.05 | 3.8 | 4.0 | 3.0 | 3.3 | 3.05 |
| 3 | 3.25 | 3.00 | 3.07 | 3.9 | 4.3 | 3.9 | 4.0 | 3.6 | 3.75 | .... | 3.2 | 2.9 |
| 4 | 3.02 | 2.83 | 3.02 | 4.0 | 4.4 | 3.8 | 3.7 | 3.6 | 3.7 | .... | 3.15 | 2.9 |
| 5 | 3.10 | 2.70 | 3.07 | 4.2 | 4.35 | 3.6 | 3.8 | 3.55 | 3.6 | .... | 3.0 | 2.8 |
| 6 | 3.05 | 2.88 | 3.87 | 4.35 | 4.0 | 3.7 | 3.8 | 3.5 | 3.75 | .... | 2.95 | 2.85 |
| 7 | 3.00 | 3.03 | 3.72 | 6.3 | 3.6 | 3.8 | 3.7 | 3.4 | 3.85 | 3.2 | 2.9 | 2.9 |
| 8 | 3.10 | 6.2 | 3.87 | 6.6 | 3.5 | 3.7 | 3.5 | 3.35 | 3.8 | 3.2 | 2.9 | 3.05 |
| 9 | 2.95 | 6.0 | 3.77 | 6.0 | 3.4 | 4.0 | 3.45 | 3.35 | 3.85 | 3.3 | 2.9 | 3.3 |
| 10 | 2.92 | 4.18 | 3.72 | 4.35 | 3.3 | 4.2 | 3.5 | 3.3 | 3.75 | 5.45 | 2.8 | 3.2 |
| 11 | 2.85 | 3.98 | 3.57 | 4.2 | 3.4 | 4.5 | 3.6 | 3.2 | 3.55 | 5.0 | 2.95 | 3.1 |
| 12 | 2.75 | 3.73 | 3.47 | 4.0 | 4.5 | 4.7 | 3.7 | 3.1 | 3.3 | 4.55 | 3.15 | 3.0 |
| 13 | 3.00 | 3.78 | 3.42 | 4.1 | 4.3 | 4.5 | 4.2 | 3.0 | 3.3 | 4.7 | 6.7 | 3.0 |
| 14 | 3.10 | 3.93 | 3.12 | 4.0 | 4.3 | 4.3 | 4.5 | 3.2 | 3.2 | 4.65 | 4.95 | 2.9 |
| 15 | 2.85 | 3.78 | 3.02 | 4.0 | 4.15 | 5.1 | 5.2 | 3.3 | 3.2 | 5.0 | 4.05 | 2.9 |
| 16 | 2.90 | 3.73 | 3.17 | 4.1 | 4.0 | 4.9 | 5.4 | 3.5 | 3.05 | 4.5 | 4.0 | 2.75 |
| 17 | 2.80 | 3.58 | 3.07 | 3.95 | 3.45 | 4.6 | 4.8 | 4.0 | 3.0 | 4.3 | .... | 2.45 |
| 18 | 2.92 | 3.68 | 3.17 | 4.0 | 3.35 | 4.4 | 4.5 | 4.4 | 3.0 | 4.5 | 3.35 | 3.55 |
| 19 | 3.10 | 3.63 | 3.12 | 4.0 | 3.25 | 4.4 | 4.4 | 4.3 | 2.95 | 4.15 | 3.25 | 3.45 |
| 20 | 2.95 | 3.48 | 3.07 | 3.95 | 3.4 | 4.2 | 4.3 | 4.1 | 2.85 | 3.6 | 3.2 | 3.25 |
| 21 | 2.80 | 3.38 | 3.02 | 3.8 | 3.3 | 4.3 | 4.3 | 4.2 | 2.8 | 3.45 | 3.1 | 5.4 |
| 22 | 2.95 | 3.40 | 2.97 | 4.0 | 4.0 | 4.0 | 4.1 | 4.6 | 3.0 | 3.35 | 3.0 | 4.6 |
| 23 | 3.02 | 3.33 | 2.77 | 4.05 | 4.1 | 3.8 | 4.0 | 5.1 | 3.15 | 3.3 | 4.05 | 3.85 |
| 24 | 3.45 | 3.30 | 2.87 | 4.0 | 3.8 | 3.4 | 3.8 | 6.3 | 3.35 | 3.3 | 3.4 | 3.5 |
| 25 | 3.60 | 3.38 | .... | 4.0 | 3.35 | 4.0 | 3.6 | 4.6 | 3.45 | 3.55 | 3.2 | 3.3 |
| 26 | 3.55 | 3.33 | .... | 4.2 | 3.5 | 4.6 | 3.7 | 5.2 | 3.45 | 3.45 | 3.2 | 3.25 |
| 27 | 3.50 | 3.18 | 3.27 | 4.1 | 3.6 | 7.3 | 4.0 | 6.25 | 3.45 | 3.3 | 3.3 | 3.15 |
| 28 | 2.95 | 3.28 | 3.17 | 4.0 | 3.7 | 6.6 | 4.2 | 6.45 | 3.3 | 3.2 | 3.2 | 3.1 |
| 29 | 2.83 | 3.12 | 3.07 | 3.8 | .... | 4.8 | 4.4 | 5.2 | 3.3 | 3.25 | 3.15 | 3.1 |
| 30 | 3.30 | 2.87 | 5.15 | 3.9 | .... | 4.6 | 4.6 | 5.35 | 3.2 | 3.2 | 3.05 | 3.05 |
| 31 | 3.25 | .... | 5.25 | 3.65 | .... | 4.1 | .... | 5.3 | .... | 3.75 | 3.0 | .... |

"This and all similar headings in this paper indicate the year ending Sept. 30 (climatic year), which includes three months of the preceding calendar year.

"NOTE.—Gage heights Oct. 14, 1910, to Dec. 31, 1911, obtained from published report of the Pittsburgh Flood Commission. Gage heights for May 23, Aug. 7, 1911; June 6, 8. 21 and Sept. 10-14, 1912, appear to be 1.0 foot too low as result of errors in observations. Gage heights Mar. 9, 17, 18, Sept. 15, Oct. 12, 1911; June 25, 26, and July 8, 1912, may also be 1 foot too low. Gage heights at other times, such as Nov. 29, 1910, and Nov. 7, 1911, may be 1.0 foot too high. Two errors of a foot each during the fourth quarter of 1912 were found by correspondence with the observer. It appears, therefore, that this gage-height record is not thoroughly reliable.

"Relation of gage height to discharge probably affected by ice about Dec. 3-23, 1910; Jan. 7-19, Feb. 5-20, and Dec. 25-31, 1912 ,and Feb. 8-16, 1913. During 1912 the observer reported river frozen over Jan. 9-19 and Dec. 25-26, 'ice going out' Dec. 30, and 'ice backing up' Dec. 31."

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Years ending September 30, 1911-1913.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1911. | | | | | | | | | | | | |
| 1 ..... | ..... | 94 | 1,290 | 590 | 3,140 | 115 | 628 | 364 | 350 | 226 | 56 | 1,420 |
| 2 ..... | ..... | 94 | 314 | 1,240 | 1,220 | 176 | 1,170 | 364 | 350 | 120 | 56 | 452 |
| 3 ..... | ..... | 118 | ..... | 3,350 | 869 | 176 | 1,290 | 246 | 350 | 59 | 92 | 314 |
| 4 ..... | ..... | 94 | ..... | 2,360 | 765 | 176 | 1,420 | 302 | 235 | 59 | 72 | 257 |
| 5 ..... | ..... | 94 | ..... | 1,500 | 572 | 176 | 3,980 | 364 | 235 | 59 | 56 | 208 |
| 6 ..... | ..... | 118 | ..... | 590 | 572 | 217 | 2,900 | 302 | 350 | 59 | 43 | 208 |
| 7 ..... | ..... | 94 | ..... | 420 | 484 | 1,320 | 2,900 | 246 | 500 | 46 | 72 | 137 |
| 8 ..... | ..... | 94 | ..... | 350 | 406 | 1,190 | 2,570 | 302 | 685 | 59 | 32 | 169 |
| 9 ..... | ..... | 94 | ..... | 290 | 572 | 92 | 2,270 | 246 | 590 | 59 | 43 | 87 |
| 10 ..... | ..... | 94 | ..... | 155 | 484 | 848 | 1,980 | 199 | 500 | 46 | 32 | 54 |
| 11 ..... | ..... | 94 | ..... | 155 | 406 | 745 | 1,700 | 105 | 590 | 76 | 23 | 452 |
| 12 ..... | ..... | 94 | ..... | 290 | 484 | 647 | 1,420 | 131 | 500 | 226 | 23 | 1,050 |
| 13 ..... | ..... | 94 | ..... | 5,890 | 279 | 1,190 | 1,700 | 105 | 500 | 149 | 16 | 452 |
| 14 ..... | 77 | 58 | ..... | 4,470 | 279 | 1,860 | 1,980 | 131 | 685 | 120 | 23 | 452 |
| 15 ..... | 77 | 94 | ..... | 2,670 | 226 | 2,300 | 2,900 | 162 | 590 | 96 | 32 | 69 |
| 16 ..... | 62 | 94 | ..... | 2,830 | 226 | 2,000 | 1,560 | 83 | 500 | 96 | 43 | 4,950 |
| 17 ..... | 77 | 58 | ..... | 1,240 | 279 | 647 | 1,170 | 105 | 420 | 96 | 43 | 2,570 |
| 18 ..... | 77 | 74 | ..... | 785 | 338 | 554 | 1,170 | 83 | 1,120 | 59 | 32 | 1,050 |
| 19 ..... | 62 | 74 | ..... | 590 | 279 | 745 | 725 | 65 | 685 | 76 | 32 | 452 |
| 20 ..... | 77 | 74 | ..... | 500 | 406 | 1,450 | 1,420 | 65 | 685 | 46 | 32 | 628 |
| 21 ..... | 77 | 58 | ..... | 350 | 338 | 1,190 | 1,700 | 83 | 500 | 59 | 43 | 725 |
| 22 ..... | 77 | 74 | ..... | 1,240 | 279 | 1,070 | 1,980 | 65 | 500 | 59 | 43 | 628 |
| 23 ..... | 125 | 74 | ..... | 1,240 | 183 | 745 | 1,700 | 83 | 420 | 96 | 72 | 536 |
| 24 ..... | 155 | 74 | 452 | 1,120 | 183 | 647 | 934 | 38 | 500 | 76 | 43 | 452 |
| 25 ..... | 100 | 94 | 452 | 1,370 | 120 | 554 | 725 | 38 | 685 | 59 | 72 | 452 |
| 26 ..... | 100 | 476 | 314 | 1,640 | 183 | 326 | 827 | 51 | 500 | 59 | 32 | 536 |
| 27 ..... | 100 | 332 | 169 | 3,000 | 183 | 268 | 725 | 912 | 685 | 59 | 23 | 628 |
| 28 ..... | 100 | 399 | 169 | 2,830 | 149 | 268 | 536 | 705 | 500 | 46 | 43 | 725 |
| 29 ..... | 108 | 1,740 | 536 | 2,360 | ..... | 392 | 725 | 518 | 420 | 34 | 72 | 628 |
| 30 ..... | 102 | 656 | 3,420 | 12,300 | ..... | 554 | 378 | 436 | 235 | 46 | 92 | 452 |
| 31 ..... | 100 | ..... | 1,700 | 3,350 | ..... | 745 | ..... | 436 | ..... | 76 | 4,200 | ..... |
| 1912. | | | | | | | | | | | | |
| 1 ..... | 3,030 | 155 | 590 | 2,510 | 890 | 2,510 | 1,920 | 155 | 100 | 235 | 785 | 235 |
| 2 ..... | 2,090 | 235 | 590 | 1,920 | 785 | 2,510 | 2,060 | 125 | 125 | 190 | 155 | 190 |
| 3 ..... | 1,530 | 190 | 500 | 1,780 | 350 | 2,210 | 1,780 | 155 | 100 | 190 | 190 | 155 |
| 4 ..... | 1,530 | 155 | 420 | 1,370 | 155 | 1,920 | 1,370 | 155 | 125 | 1,640 | 190 | 102 |
| 5 ..... | 1,400 | 125 | 500 | 1,000 | ..... | 1,640 | 1,240 | 125 | 100 | 1,120 | 155 | 105 |
| 6 ..... | 1,020 | 890 | 350 | 685 | ..... | 1,500 | 1,370 | 235 | 125 | 1,000 | 125 | 102 |
| 7 ..... | 1,530 | 2,670 | 235 | ...... | ..... | 1,920 | 890 | 290 | 125 | 890 | 155 | 64 |
| 8 ..... | 2,390 | 890 | 290 | ...... | ..... | 2,210 | 785 | 235 | 100 | 125 | 155 | 64 |
| 9 ..... | 1,530 | 685 | 235 | ...... | ..... | 2,360 | 685 | 190 | 125 | 350 | 155 | 51 |
| 10 ..... | 1,810 | 590 | 190 | ...... | ..... | 2,510 | 890 | 685 | 62 | 190 | 125 | 125 |
| 11 ..... | 1,950 | 500 | 155 | ...... | ..... | 2,210 | 785 | 500 | 62 | 190 | 100 | 102 |
| 12 ..... | 518 | 350 | 190 | ...... | ..... | 2,360 | 350 | 5,470 | 62 | 190 | 100 | 105 |
| 13 ..... | 912 | 290 | 235 | ...... | ..... | 1,370 | 235 | 4,090 | 36 | 290 | 125 | 108 |
| 14 ..... | 590 | 235 | 290 | ...... | ..... | 1,640 | 290 | 3,530 | 62 | 235 | 100 | 105 |
| 15 ..... | 785 | 235 | 350 | ...... | ..... | 2,360 | 235 | 3,170 | 62 | 890 | 100 | 65 |

## Daily Discharge, in second-feet, of Shavers Fork, at Parsons, W. Va., for the Year ending September 30, 1911-1913—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 ..... | 1,500 | 290 | 685 | ...... | ..... | 6,110 | 190 | 3,710 | 62 | 685 | 125 | 100 |
| 17 ..... | 685 | 235 | 1,370 | ...... | ..... | 5,000 | 350 | 3,350 | 79 | 685 | 100 | 105 |
| 18 ..... | 6,330 | 350 | 890 | ...... | ..... | 3,500 | 290 | 1,920 | 1,120 | 4,090 | 79 | 102 |
| 19 ..... | 1,920 | 700 | 1,000 | ...... | ..... | 2,000 | 685 | 1,370 | 1,240 | 3,530 | 100 | 79 |
| 20 ..... | 1,370 | 1,200 | 890 | 2,210 | ..... | 2,200 | 685 | 685 | 1,370 | 1,120 | 125 | 105 |
| 21 ..... | 890 | 900 | 785 | 2,360 | 500 | 2,700 | 500 | 420 | 785 | 685 | 190 | 100 |
| 22 ..... | 1,240 | 700 | 420 | 1,920 | 590 | 3,710 | 420 | 420 | 590 | 6,790 | 155 | 100 |
| 23 ..... | 1,370 | 500 | 685 | 2,060 | 1,000 | 3,000 | 350 | 350 | 685 | 4,670 | 350 | 162 |
| 24 ..... | 1,120 | 420 | 890 | 1,920 | 1,120 | 1,640 | 235 | 290 | 685 | 1,920 | 235 | 1,640 |
| 25 ..... | 685 | 350 | 1,370 | 1,780 | 1,370 | 1,500 | 290 | 235 | 100 | 7,740 | 155 | 1,920 |
| 26 ..... | 685 | 290 | 1,920 | 1,640 | 3,710 | 1,500 | 350 | 155 | 125 | 890 | 235 | 735 |
| 27 ..... | 290 | 350 | 2,060 | 1,370 | 6,330 | 1,370 | 235 | 235 | 590 | 1,120 | 350 | 735 |
| 28 ..... | 235 | 235 | 1,920 | 1,240 | 4,470 | 1,920 | 290 | 125 | 420 | 685 | 235 | 518 |
| 29 ..... | 190 | 190 | 1,780 | 1,640 | 2,830 | 2,210 | 350 | 155 | 590 | 590 | 190 | 320 |
| 30 ..... | 235 | 235 | 1,370 | 2,060 | ..... | 3,530 | 290 | 125 | 350 | 890 | 190 | 246 |
| 31 ..... | 190 | ..... | 1,920 | 1,640 | ..... | 1,920 | ..... | 125 | ..... | 785 | 235 | ..... |
| 1913. | | | | | | | | | | | | |
| 1 ..... | 190 | 166 | 74 | ...... | 562 | 800 | 905 | 700 | 1,260 | 98 | 245 | 124 |
| 2 ..... | 162 | 120 | 94 | 700 | 605 | 700 | 750 | 520 | 700 | 98 | 198 | 111 |
| 3 ..... | 172 | 100 | 118 | 605 | 1,020 | 605 | 700 | 365 | 480 | 110 | 158 | 76 |
| 4 ..... | 105 | 67 | 105 | 700 | 1,140 | 520 | 440 | 365 | 440 | 120 | 141 | 76 |
| 5 ..... | 125 | 48 | 118 | 905 | 1,080 | 365 | 520 | 332 | 365 | 140 | 98 | 56 |
| 6 ..... | 112 | 76 | 563 | 1,080 | 700 | 440 | 520 | 300 | 480 | 150 | 87 | 66 |
| 7 ..... | 100 | 108 | 436 | 4,090 | 365 | 520 | 440 | 245 | 562 | 158 | 76 | 76 |
| 8 ..... | 125 | 3,900 | 563 | 4,670 | ..... | 440 | 300 | 222 | 520 | 158 | 76 | 111 |
| 9 ..... | 90 | 3,530 | 476 | 3.530 | ..... | 700 | 272 | 222 | 562 | 198 | 76 | 193 |
| 10 ..... | 83 | 869 | 436 | 1,080 | ..... | 905 | 300 | 198 | 480 | 2,590 | 56 | 158 |
| 11 ..... | 70 | 666 | 332 | 905 | ..... | 1,260 | 365 | 158 | 332 | 1,930 | 87 | 124 |
| 12 ..... | 55 | 444 | 274 | 700 | ..... | 1,520 | 440 | 124 | 198 | 1,320 | 141 | 98 |
| 13 ..... | 100 | 484 | 246 | 800 | ..... | 1,260 | 905 | 98 | 198 | 1,520 | 4,870 | 98 |
| 14 ..... | 125 | 618 | 131 | 700 | ..... | 1,020 | 1,260 | 158 | 158 | 1,460 | 1,860 | 76 |
| 15 ..... | 70 | 484 | 105 | 700 | ..... | 2,070 | 2,220 | 198 | 158 | 1,930 | 750 | 76 |
| 16 ..... | 79 | 444 | 146 | 800 | ..... | 1,790 | 2,510 | 300 | 111 | 1,260 | 700 | 43 |
| 17 ..... | 62 | 338 | 118 | 652 | 272 | 1,390 | 1,660 | 700 | 98 | 1,020 | [a]461 | 16 |
| 18 ..... | 83 | 406 | 146 | 700 | 222 | 1,140 | 1,260 | 1,140 | 98 | 1,260 | 222 | 332 |
| 19 ..... | 125 | 371 | 131 | 700 | 178 | 1,140 | 1,140 | 1,020 | 87 | 852 | 178 | 272 |
| 20 ..... | 90 | 279 | 118 | 652 | 245 | 905 | 1,020 | 800 | 66 | 365 | 158 | 178 |
| 21 ..... | 62 | 226 | 105 | 520 | 198 | 1,020 | 1,020 | 905 | 56 | 272 | 124 | 2,510 |
| 22 ..... | 90 | 235 | 94 | 700 | 700 | 700 | 800 | 1,390 | 98 | 222 | 98 | 1,390 |
| 23 ..... | 105 | 204 | 58 | 750 | 800 | 520 | 700 | 2,070 | 141 | 198 | 750 | 562 |
| 24 ..... | 262 | 190 | 74 | 700 | 520 | 245 | 520 | 4,090 | 222 | 198 | 245 | 300 |
| 25 ..... | 350 | 226 | ..... | 700 | 222 | 700 | 365 | 1,390 | 272 | 332 | 158 | 198 |
| 26 ..... | 320 | 204 | ..... | 905 | 300 | 1,390 | 440 | 2,220 | 272 | 272 | 158 | 178 |
| 27 ..... | 290 | 149 | ..... | 800 | 365 | 6,110 | 700 | 4,000 | 272 | 198 | 198 | 141 |
| 28 ..... | 90 | 183 | ..... | 700 | 440 | 4,670 | 905 | 4,380 | 198 | 158 | 158 | 124 |
| 29 ..... | 67 | 131 | ..... | 520 | ..... | 1,660 | 1,140 | 2,220 | 198 | 178 | 141 | 124 |
| 30 ..... | 190 | 74 | ..... | 605 | ..... | 1,390 | 1,390 | 2,440 | 158 | 158 | 111 | 111 |
| 31 ..... | 172 | ..... | ..... | 402 | ..... | 800 | ..... | 2,360 | ..... | 480 | 93 | ..... |

[a]Interpolated.

"NOTE.—Daily discharge computed from a faily well defined rating curve. See 'Accuracy' in station description.

"Discharge estimated, because of ice, from gage heights, observer's notes, and discharge of adjacent drainage areas, as follows: Dec. 3 to 23, 1910, 80 second-feet; Jan. 7 to 19, 1912, 300 second-feet; Feb. 5 to 20, 1912, 100 second-feet; Dec. 25, 1912, to Jan. 1, 1913, 400 second-feet; Feb. 8 to 16, 1913, 400 second-feet. Mean discharge, Oct. 1 to 13, 1910, estimated in order to complete the year ending Sept. 30, 1911, as 100 second-feet. Daily discharge, Nov. 18 to 23, 1911, Mar. 17-21, 1912, and July 3 to 6, 1913, estimated because gage was not read. Daily discharge, May 23 and Aug. 7, 1911, obtained by adding 1 foot to reported gage height before entering rating table."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Years ending September 30, 1911-1913.

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). | Accuracy. |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | | |
| **1911.** | | | | | | |
| October | ....... | ....... | 95.2 | 0.453 | 0.52 | C. |
| November | 1,740 | 58 | 192 | .914 | 1.02 | B. |
| December | 3,420 | ....... | 339 | 1.61 | 1.86 | D. |
| January | 12,300 | 155 | 1,970 | 9.38 | 10.81 | C. |
| February | 3,140 | 120 | 497 | 2.37 | 2.47 | B. |
| March | 2,300 | 92 | 754 | 3.59 | 4.14 | B. |
| April | 3,980 | 378 | 1,570 | 7.48 | 8.34 | B. |
| May | 912 | 38 | 237 | 1.13 | 1.30 | B. |
| June | 1,120 | 235 | 512 | 2.44 | 2.72 | B. |
| July | 226 | 34 | 80.7 | .384 | .44 | C. |
| August | 4,200 | 16 | 180 | .857 | .99 | D. |
| September | 4,950 | 54 | 706 | 3.36 | 3.75 | C. |
| The year | 12,300 | ....... | 594 | 2.83 | 38.36 | |
| **1912.** | | | | | | |
| October | 6,330 | 190 | 1,340 | 6.38 | 7.36 | B. |
| November | 2,670 | 125 | 505 | 2.40 | 2.68 | C. |
| December | 2,060 | 155 | 809 | 3.85 | 4.44 | C. |
| January | 2,510 | ....... | 1,130 | 5.38 | 6.20 | D. |
| February | 6,330 | ....... | 886 | 4.22 | 4.55 | C. |
| March | 6,110 | 1,370 | 2,420 | 11.5 | 13.26 | C. |
| April | 2,060 | 190 | 680 | 3.24 | 3.62 | B. |
| May | 5,470 | 125 | 1,060 | 5.05 | 5.82 | B. |
| June | 1,370 | ....... | 339 | 1.61 | 1.80 | C. |
| July | 7,740 | 125 | 1,440 | 6.86 | 7.91 | B. |
| August | 785 | 79 | 186 | .886 | 1.02 | B. |
| September | 1,920 | ....... | 288 | 1.37 | 1.53 | C |
| The year | 7,740 | ....... | 929 | 4.42 | 60.19 | |
| **1913.** | | | | | | |
| October | 350 | 55 | 133 | .633 | .73 | B. |
| November | 3,900 | 48 | 511 | 2.43 | 2.71 | B. |
| December | 563 | ...... | 254 | 1.21 | 1.40 | C. |
| January | 4,670 | 402 | 1,040 | 4.95 | 5.71 | B. |
| February | ...... | ...... | 483 | 2.30 | 2.40 | C. |
| March | 6,110 | 245 | 1,250 | 5.95 | 6.86 | B. |
| April | 2,510 | 272 | 864 | 4.11 | 4.59 | B. |
| May | 4,380 | 98 | 1,150 | 5.48 | 6.32 | B. |
| June | 1,260 | 56 | 308 | 1.47 | 1.64 | B. |
| July | 2,590 | 98 | 626 | 2.98 | 3.44 | B. |
| August | 4,870 | 56 | 415 | 1.98 | 2.28 | B. |
| September | 2,510 | 16 | 267 | 1.27 | 1.42 | B. |
| The year | 6,110 | ...... | 611 | 2.91 | 39.50 | |

"NOTE.—See 'Accuracy' in station description and foot-note to table of daily discharge."

"B," within 10 per cent.; "C," within 15 per cent.; "D," within 25 per cent

The following data regarding the gaging station on Shavers Fork are given on page 36 of Water-Supply Paper 383:

"**Channel and control.**—Channel rocky. Control, coarse gravel and rocks; probably permanent. Levels run September 4, 1912, indicate that there would be no flow past the gage if the river were to fall to a stage of 1.8 feet ± 0.2 foot. On November 8, 1913, this stage was found to be 1.9 feet ± 0.1 foot.

"**Extremes of discharge.**—Maximum stage recorded during year: 8.6 feet at 5 p. m. November 16; discharge, 9,180 second-feet: Minimum stage recorded: 2.2 feet, September 25; discharge, 4 second-feet. High waters of 1888 and 1907 reached a height of approximately 12.5 feet referred to present gage datum".

## Discharge Measurements of Shavers Fork at Parsons, W. Va., during the Year ending September 30, 1914.

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | Feet. | Sec.-ft. |
| Oct. 22 | H. P. Drake[a] | 4.13 | 846 |
| Oct. 22 | H. P. Drake[a] | 4.13 | 844 |
| Nov. 8 | Peterson and Walters | 3.28 | 175 |
| Mar. 30 | H. P. Drake[a] | 5.18 | 2,320 |
| Mar. 30 | H. P. Drake[a] | 5.18 | 2,320 |

[a]Engineer of the West Virginia Development Co.

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1914.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100 | 520 | 440 | 440 | ..... | 295 | 3,260 | 480 | 34 | 144 | 113 | 88 |
| 2 | 128 | 440 | 440 | 365 | ..... | 208 | 4,000 | 365 | 28 | 88 | 88 | 68 |
| 3 | 365 | 330 | 480 | 264 | ..... | 183 | 3,000 | 233 | 34 | 88 | 88 | 52 |
| 4 | 605 | 164 | 480 | 233 | ..... | 144 | 1,590 | 208 | 52 | 68 | 68 | 52 |
| 5 | 440 | 128 | 402 | 183 | ..... | 183 | 1,140 | 295 | 60 | 88 | 68 | 68 |
| 6 | 264 | 113 | 365 | .... | ..... | 233 | 750 | 2,140 | 295 | 108 | 78 | 52 |
| 7 | 183 | 144 | 605 | .... | ..... | 183 | 562 | 1,320 | 113 | 128 | 68 | 52 |
| 8 | 144 | 164 | 480 | .... | ..... | 183 | 605 | 750 | 78 | 113 | 60 | 52 |
| 9 | 264 | 233 | 264 | .... | ..... | 144 | 2,360 | 520 | 60 | 68 | 68 | 52 |
| 10 | 800 | 264 | 233 | .... | 520 | 144 | 2,070 | 295 | 52 | 52 | 88 | 46 |
| 11 | 520 | 562 | 183 | .... | 440 | 183 | 1,320 | 233 | 46 | 52 | 78 | 46 |
| 12 | 520 | 520 | 144 | .... | 365 | 144 | 605 | 208 | 34 | 52 | 113 | 39 |
| 13 | 440 | 1,460 | 164 | .... | 330 | 183 | 520 | 183 | 28 | 68 | 164 | 28 |
| 14 | 330 | 5,170 | 183 | .... | 264 | 233 | 480 | 183 | 19 | 128 | 100 | 39 |
| 15 | 264 | 5,070 | 330 | .... | 233 | 365 | 905 | 208 | 19 | 905 | 88 | 39 |
| 16 | 233 | 8,460 | 330 | .... | 208 | 1,080 | 3,080 | 208 | 12 | 1,390 | 68 | 39 |
| 17 | 208 | 4,180 | 295 | .... | 183 | 1,720 | 2,290 | 183 | 12 | 480 | 68 | 39 |
| 18 | 233 | 1,790 | 295 | .... | 295 | 1,460 | 1,520 | 128 | 19 | 295 | 52 | 28 |
| 19 | 295 | 1,320 | 233 | .... | 1,660 | 1,390 | 800 | 113 | 19 | 233 | 68 | 19 |
| 20 | 1,320 | 960 | 183 | .... | 4,090 | 905 | 2,220 | 100 | 28 | 208 | 52 | 19 |
| 21 | 1,860 | 800 | 113 | .... | 2,070 | 905 | 2,360 | 88 | 19 | 183 | 52 | 19 |
| 22 | 960 | 700 | 164 | .... | 700 | 905 | 905 | 78 | 28 | 128 | 56 | 16 |
| 23 | 800 | 605 | 233 | .... | 562 | 480 | 852 | 65 | 60 | 88 | 60 | 12 |
| 24 | 1,320 | 480 | 233 | .... | 365 | 562 | 800 | 52 | 1,200 | 88 | 64 | 7 |
| 25 | 3,170 | 402 | 183 | ... | 365 | 1,460 | 960 | 39 | 1,080 | 68 | 68 | 4 |
| 26 | 2,830 | 330 | 1,020 | .... | 330 | 3,000 | 5,070 | 46 | 1,200 | 88 | 88 | 7 |
| 27 | 1,390 | 295 | 905 | .... | 365 | 3,080 | 3,350 | 46 | 1,140 | 88 | 164 | 7 |
| 28 | 1,020 | 365 | 800 | .... | 365 | 3,350 | 1,320 | 46 | 800 | 365 | 233 | 7 |
| 29 | 750 | 440 | 700 | .... | ..... | 3,350 | 905 | 52 | 233 | 144 | 164 | 7 |
| 30 | 700 | 365 | 700 | .... | ..... | 1,930 | 750 | 46 | 183 | 113 | 144 | 12 |
| 31 | 605 | ..... | 480 | .... | ..... | 3,350 | ..... | 39 | ..... | 88 | 113 | .. |

"NOTE.—Daily discharge determined from rating curve well defined between 39 and 7,740 second-feet. Open-water rating curve used throughout the year; discharge relation probably not materially affected by ice. No record January 6 to February 9."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1914.

(Drainage area 210 square miles.)

| Month. | Discharge in second-feet. | | | | Run-off (Depth in inches on drainage area). | Accuracy. |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | | |
| October ...... | 3,170 | 100 | 744 | 3.54 | 4.08 | B. |
| November .... | 8,460 | 113 | 1,230 | 5.86 | 6.54 | B. |
| December ..... | 1,020 | 113 | 389 | 1.85 | 2.13 | B. |
| February 10-28. | 4,090 | 183 | 722 | 3.44 | 2.43 | C. |
| March ....... | 3,350 | 144 | 1,030 | 4.90 | 5.65 | B. |
| April ........ | 5,070 | 480 | 1,680 | 8.00 | 8.93 | B. |
| May ......... | 2,140 | 39 | 289 | 1.38 | 1.59 | B. |
| June ......... | 1,200 | 12 | 233 | 1.11 | 1.24 | B. |
| July ......... | 1,390 | 52 | 200 | .952 | 1.10 | B. |
| August ....... | 233 | 52 | 91.7 | .437 | .50 | B. |
| September .... | 88 | 4 | 33.8 | .161 | .18 | C. |

"B," within 10 per cent; "C," within 15 per cent.

The following data regarding the gaging records for 1915 at this station are given on pages 37-38 of Water-Supply Paper 403:

"**Extremes of Discharge.**—Maximum stage recorded during year, 9.3 feet at 7 a. m. January 7 (discharge, 10,900 second-feet); minimum stage, 2 feet at 7 a. m. October 7 and 6 p. m. June 25 (discharge, 1 second-foot).

"**Regulation.**—The flow at low stages may be affected by the storage of water at a pulp mill dam about three-fourths mile above the station.

"**Accuracy.**—Records of daily discharge are considered good.

"The following discharge measurements were made by J. G. Mathers: November 26, 1914: Gage height, 2.89 feet; discharge, 63.7 second-feet and 63.6 second-feet."

### Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1915.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 12 | 144 | 164 | 605 | 2,220 | 365 | 113 | 520 | 1,860 | 88 | 144 | 183 |
| 2.. | 10 | 100 | 480 | 440 | 6,330 | 348 | 113 | 520 | 2,070 | 88 | 183 | 183 |
| 3.. | 7 | 88 | 480 | 365 | 4,670 | 330 | 128 | 562 | 2,360 | 113 | 208 | 164 |
| 4.. | 4 | 88 | 520 | 183 | 1,930 | 330 | 144 | 520 | 2,830 | 88 | 144 | 144 |
| 5.. | 4 | 78 | 562 | 233 | 652 | 402 | 113 | 520 | 2,220 | 1,860 | 113 | 144 |
| 6.. | 4 | 68 | 905 | 264 | 520 | 365 | 128 | 365 | 440 | 1,790 | 128 | 113 |
| 7.. | 3 | 68 | 440 | 8,220 | 440 | 365 | 208 | 402 | 183 | 1,520 | 100 | 144 |
| 8.. | 7 | 88 | 480 | 2,220 | 402 | 264 | 330 | 330 | 144 | 1,590 | 144 | 113 |
| 9.. | 19 | 88 | 520 | 1,020 | 365 | 233 | 295 | 183 | 144 | 1,390 | 144 | 144 |
| 10.. | 16 | 68 | 562 | 700 | 295 | 183 | 365 | 183 | 113 | 1,460 | 128 | 113 |
| 11.. | 12 | 68 | 440 | 605 | 402 | 183 | 1,930 | 233 | 113 | 1,520 | 164 | 105 |
| 12.. | 7 | 88 | 330 | 750 | 402 | 144 | 2,220 | 233 | 128 | 520 | 183 | 96 |
| 13.. | 12 | 68 | 233 | 700 | 700 | 144 | 1,520 | 183 | 113 | 440 | 183 | 88 |
| 14.. | 12 | 68 | 183 | 1,080 | 905 | 113 | 1,460 | 144 | 2,590 | 402 | 365 | 88 |
| 15.. | 183 | 88 | 160 | 1,720 | 1,460 | 128 | 1,080 | 144 | 2,670 | 233 | 183 | 78 |
| 16.. | 200 | 78 | 136 | 1,840 | 2,360 | 144 | 700 | 113 | 2,360 | 208 | 605 | 88 |
| 17.. | 128 | 68 | 113 | 1,950 | 1,720 | 113 | 750 | 113 | 1,790 | 183 | 1,260 | 68 |
| 18.. | 144 | 68 | 144 | 2,070 | 905 | 128 | 605 | 100 | 1,390 | 233 | 700 | 78 |
| 19.. | 128 | 68 | 128 | 5,270 | 750 | 144 | 605 | 88 | 402 | 183 | 562 | 144 |
| 20.. | 113 | 52 | 800 | 2,220 | 605 | 144 | 562 | 113 | 295 | 144 | 365 | 144 |
| 21.. | 113 | 60 | 2,510 | 1,660 | 440 | 144 | 520 | 113 | 183 | 164 | 295 | 164 |
| 22.. | 113 | 68 | 1,520 | 700 | 365 | 113 | 330 | 144 | 144 | 183 | 520 | 144 |
| 23.. | 113 | 88 | 750 | 520 | 233 | 128 | 480 | 233 | 144 | 144 | 402 | 113 |
| 24.. | 128 | 78 | 440 | 295 | 402 | 113 | 520 | 208 | 113 | 144 | 295 | 144 |
| 25.. | 113 | 78 | 330 | 440 | 700 | 88 | 520 | 208 | 88 | 128 | 233 | 128 |
| 26.. | 113 | 60 | 233 | 402 | 700 | 88 | 365 | 233 | 88 | 113 | 233 | 113 |
| 27.. | 88 | 52 | 183 | 233 | 520 | 88 | 233 | 208 | 88 | 100 | 183 | 113 |
| 28.. | 100 | 68 | 144 | 164 | 365 | 113 | 562 | 264 | 52 | 88 | 208 | 113 |
| 29.. | 128 | 52 | 233 | 144 | ..... | 113 | 605 | 365 | 46 | 144 | 520 | 88 |
| 30.. | 183 | 60 | 1,520 | 128 | ..... | 100 | 750 | 700 | 60 | 183 | 402 | 208 |
| 31.. | 144 | ..... | 1,200 | 700 | ..... | 144 | ..... | 2,360 | ..... | 144 | 233 | ..... |

"NOTE.—Discharge determined from a rating curve well defined between 39 and 7,740 second-feet and fairly well defined at other stages. Open-water rating curve used throughout the year; discharge relation probably not materially affected by ice. Discharge interpolated Dec. 15, 16, Jan. 16, 17, Mar. 2, July 25, Sept. 11 and 12. Discharge estimated Oct. 16 because of error in gage reading."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1915.

(Drainage area 210 square miles.)

| Month. | Discharge in second-feet. Maximum. | Minimum. | Mean. | Per square mile. | Run-off (depth in inches on drainage area). | Accuracy. |
|---|---|---|---|---|---|---|
| October | [a]200 | 3 | 76.2 | 0.363 | 0.42 | A. |
| November | 144 | 52 | 75.2 | .358 | .40 | A. |
| December | 2,510 | 113 | 543 | 2.59 | 2.99 | A. |
| January | 8,220 | 128 | 1,220 | 5.81 | 6.70 | A. |
| February | 6,330 | 233 | 1,130 | 5.38 | 5.60 | A. |
| March | 402 | 88 | 1,870 | 8.90 | 10.26 | A. |
| April | 2,220 | 113 | 608 | 2.90 | 3.24 | A. |
| May | 2,360 | 88 | 342 | 1.63 | 1.88 | A. |
| June | 2,830 | 46 | 841 | 4.00 | 4.46 | A. |
| July | 1,860 | 88 | 503 | 2.40 | 2.77 | A. |
| August | 1,260 | 100 | 307 | 1.46 | 1.68 | A. |
| September | 208 | 68 | 125 | .595 | .66 | A. |
| The year. | 8,220 | 3 | 493 | 2.35 | 41.06 | |

[a]Estimated.

"A," within 5 per cent.

The following data concerning the records of this station for the year 1916 are published on page 41 of the Water-Supply Paper 433:

"Extremes of discharge.—Maximum stage recorded during year, 9.0 feet at 6 p. m. October 1 (discharge, 10,100 second-feet); minimum stage, 2.55 feet September 28 (discharge, 24 second-feet).

"Accuracy.—Stage-discharge relation practically permanent, affected by ice in December and January. Rating curve well defined between 40 and 7,700 second-feet, beyond these limits curve is an extension. Gage read twice daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table. Discharge interpolated on following days when gage was not read: October 16, 17, December 11, June 5, 20, and August 13; estimated because of ice: December 15, 16, and January 18; estimated on August 3 and 4 when gage was not read. Results good."

## Discharge Measurements of Shavers Fork at Parsons, W. Va., during the Year ending September 30, 1916.

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | Feet. | Sec.-ft. |
| Mar. 25 | J. E. Stewart...................... | 4.12 | 927 |
| Mar. 28 | J. E. Stewart...................... | 4.99 | 1,880 |
| Mar. 29 | J. E. Stewart...................... | 4.58 | 1,380 |
| Sept. 14 | Lasley Lee........................ | 2.80 | 56.6 |

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1916.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 4.470 | 183 | 144 | 2,510 | 1,860 | 264 | 700 | 605 | 380 | 183 | 144 | 68 |
| 2.. | 3,350 | 164 | 113 | 6.110 | 1,520 | 295 | 700 | 440 | 330 | 183 | 183 | 52 |
| 3.. | 1,390 | 144 | 88 | 1,930 | 905 | 295 | 605 | 280 | 365 | 295 | 180 | 88 |
| 4.. | 700 | 88 | 88 | 905 | 562 | 264 | 562 | 440 | 365 | 700 | 350 | 88 |
| 5.. | 605 | 100 | 88 | 652 | 520 | 183 | 480 | 456 | 299 | 233 | 700 | 38 |
| 6.. | 440 | 88 | 113 | 605 | 520 | 295 | 440 | 380 | 233 | 233 | 905 | 113 |
| 7.. | 520 | 88 | 88 | 700 | 1,200 | 2,830 | 402 | 520 | 183 | 183 | 700 | 63 |
| 8.. | 480 | 144 | 73 | 440 | 750 | 2,830 | 365 | 652 | 233 | 100 | 402 | 52 |
| 9.. | 295 | 100 | 88 | 295 | 520 | 800 | 440 | 365 | 233 | 113 | 295 | 52 |
| 10.. | 183 | 113 | 88 | 330 | 440 | 1,520 | 295 | 480 | 365 | 113 | 183 | 63 |
| 11.. | 128 | 128 | 78 | 3,170 | 365 | 1,390 | 295 | 365 | 295 | 233 | 183 | 52 |
| 12.. | 144 | 144 | 68 | 4,470 | 1.930 | 1,390 | 800 | 208 | 264 | 144 | 233 | 46 |
| 13.. | 144 | 183 | 68 | 1,930 | 3,000 | 365 | 905 | 233 | 183 | 233 | 233 | 39 |
| 14.. | 144 | 233 | 52 | 1,520 | 1,460 | 1,520 | 905 | 183 | 183 | 68 | 233 | 42 |
| 15.. | 113 | 330 | 50 | 905 | 750 | 3,530 | 700 | 183 | 233 | 113 | 183 | 1,320 |
| 16.. | 118 | 233 | 50 | 800 | 520 | 3,170 | 700 | 175 | 183 | 233 | 183 | 365 |
| 17.. | 123 | 264 | 1,660 | 605 | 402 | 1,860 | 750 | 605 | 233 | 700 | 295 | 233 |
| 18.. | 128 | 233 | 6,110 | 400 | 440 | 1,460 | 605 | 295 | 700 | 905 | 233 | 183 |
| 19.. | 365 | 264 | 2,670 | 233 | 365 | 1,790 | 520 | 208 | 700 | 402 | 113 | 183 |
| 20.. | 1,080 | 233 | 852 | 330 | 295 | 605 | 440 | 164 | 802 | 183 | 100 | 88 |
| 21.. | 852 | 144 | 652 | 330 | 365 | 295 | 365 | 113 | 905 | 183 | 113 | 88 |
| 22.. | 700 | 208 | 440 | 1,520 | 330 | 2,360 | 380 | 183 | 1,020 | 295 | 88 | 113 |
| 23.. | 520 | 164 | 365 | 1,140 | 365 | 1,460 | 440 | 119 | 1,020 | 113 | 365 | 113 |
| 24.. | 520 | 144 | 233 | 800 | 295 | 1,020 | 605 | 113 | 295 | 183 | 365 | 88 |
| 25.. | 440 | 144 | 233 | 605 | 365 | 1,020 | 1,020 | 144 | 1,390 | 295 | 88 | 60 |
| 26.. | 233 | 144 | 365 | 480 | 440 | 1,020 | 750 | 208 | 905 | 144 | 52 | 52 |
| 27.. | 233 | 144 | 365 | 365 | 440 | 905 | 1,020 | 1,020 | 800 | 233 | 68 | 39 |
| 28.. | 233 | 183 | 562 | 402 | 365 | 1,930 | 1,020 | 233 | 183 | 164 | 68 | 24 |
| 29.. | 183 | 164 | 2,070 | 440 | 365 | 1,260 | 800 | 295 | 144 | 144 | 52 | 1,520 |
| 30.. | 233 | 144 | 2,830 | 3,170 | ..... | 960 | 700 | 520 | 233 | 183 | 68 | 1,200 |
| 31.. | 233 | ..... | 1,460 | 1,590 | ..... | 1,140 | ..... | 605 | ..... | 183 | 52 | ..... |

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1916.

(Drainage area, 210 square miles).

| Month | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum | Minimum | Mean. | Per square mile | |
| October | 4,470 | 113 | 623 | 2.97 | 3.42 |
| November | 330 | 88 | 168 | .80 | 0.89 |
| December | 6,110 | [a]50 | 716 | 3.41 | 3.93 |
| January | 6,110 | 233 | 1,280 | 6.10 | 7.03 |
| February | 3,000 | 295 | 747 | 3.56 | 3.84 |
| March | 3,530 | 183 | 1,290 | 6.14 | 7.08 |
| April | 1,020 | 295 | 624 | 2.97 | 3.31 |
| May | 1,020 | 113 | 351 | 1.67 | 1.92 |
| June | 1,390 | 144 | 455 | 2.17 | 2.42 |
| July | 905 | 68 | 247 | 1.18 | 1.36 |
| August | 905 | 52 | 239 | 1.14 | 1.31 |
| September | 1,520 | 24 | 220 | 1.05 | 1.17 |
| The year | 6,110 | 24 | 582 | 2.77 | 37.68 |

[a]Estimated.

The following remarks concerning the records of this gaging station for the year 1917 are taken from pages 33-34 of Water-Supply Paper 453:

"**Extremes of discharge.**—Maximum stage recorded during year, 9.90 feet at 8 a. m. March 12 (discharge, 12,300 second-feet); minimum stage, 2.15 feet September 8 (discharge, 3 second-feet).

"**Accuracy.**—Stage-discharge relation practically permanent, affected by ice December 13-20, and February 6-16. A discharge measurement made in September, 1917, indicated a change in the stage-discharge relation below 300 second-feet. It was assumed that the change in relation occurred during the high water of March. Rating curve used to March 11, and curve used March 12 to September 30, well defined between 40 and 10,000 second-feet; beyond these limits curve is an extension. Gage read twice daily to tenths. Daily discharge ascertained by applying mean daily gage heights to rating table. Results good except for periods affected by ice, for which they are poor.

"The following discharge measurement was made by Peterson and Hopkins: September 24; Gage height 2.82 feet, discharge, 48 second-feet."

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1917.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 520 | 78 | 183 | 402 | 960 | 1,320 | 260 | 562 | 1,020 | 30 | 61 | 30 |
| 2.. | 440 | 88 | 183 | 295 | 1,140 | 1,200 | 440 | 520 | 960 | 104 | 54 | 22 |
| 3.. | 183 | 52 | 183 | 1,020 | 1,260 | 1,200 | 402 | 365 | 750 | 54 | 46 | 22 |
| 4.. | 183 | 88 | 128 | 1,260 | 1,140 | 2,510 | 365 | 260 | 480 | 54 | 50 | 15 |
| 5.. | 144 | 52 | 183 | 1,080 | 905 | 2,000 | 562 | 199 | 480 | 54 | 54 | 15 |
| 6.. | 113 | 52 | 144 | 3,350 | | 750 | 800 | 199 | 365 | 46 | 40 | 54 |
| 7.. | 88 | 52 | 144 | 1,020 | | 750 | 700 | 199 | 260 | 199 | 25 | 480 |
| 8.. | 88 | 60 | 144 | 800 | | 2,510 | 852 | 750 | 199 | 330 | 154 | 1,460 |
| 9.. | 88 | 39 | 164 | 520 | | 1,720 | 800 | 852 | 199 | 54 | 199 | 652 |
| 10.. | 113 | 52 | 144 | 365 | | 960 | 605 | 750 | 260 | 54 | 199 | 652 |
| 11.. | 144 | 52 | 128 | 295 | 60 | 2,510 | 652 | 480 | 480 | 225 | 260 | 120 |
| 12.. | 100 | 46 | 128 | 144 | | 12,300 | 905 | 480 | 295 | 54 | 154 | 120 |
| 13.. | 88 | 52 | | 138 | | 3,900 | 852 | 480 | 260 | 54 | 46 | 120 |
| 14.. | 78 | 78 | | 113 | | 4,090 | 700 | 365 | 225 | 54 | 61 | 120 |
| 15.. | 88 | 68 | | 295 | | 3,530 | 562 | 365 | 154 | 70 | 40 | 154 |
| 16.. | 144 | 60 | 100 | 520 | | 1,590 | 562 | 330 | 154 | 104 | 40 | 154 |
| 17.. | 233 | 60 | | 330 | 100 | 1,590 | 440 | 260 | 135 | 104 | 46 | 22 |
| 18.. | 295 | 68 | | 295 | 144 | 2,220 | 402 | 199 | 80 | 562 | 40 | 3 |
| 19.. | 440 | 52 | | 264 | 144 | 1,020 | 402 | 199 | 75 | 154 | 30 | 30 |
| 20.. | 520 | 52 | | 295 | 537 | 852 | 330 | 199 | 70 | 154 | 25 | 23 |
| 21.. | 605 | 52 | 183 | 520 | 1,520 | 852 | 330 | 120 | 70 | 330 | 22 | 25 |
| 22.. | 605 | 52 | 1,260 | 6,330 | 1,260 | 2,670 | 330 | 120 | 61 | 199 | 30 | 15 |
| 23.. | 365 | 88 | 1,790 | 1,660 | 562 | 1,390 | 225 | 154 | 61 | 199 | 18 | 22 |
| 24.. | 605 | 144 | 1,930 | 800 | 1,930 | 3,000 | 199 | 154 | 54 | 199 | 15 | 22 |
| 25.. | 520 | 144 | 365 | 605 | 2,000 | 2,000 | 199 | 135 | 40 | 440 | 15 | 40 |
| 26.. | 520 | 113 | 295 | 365 | 1,020 | 1,790 | 199 | 154 | 30 | 1,590 | 22 | 38 |
| 27.. | 440 | 113 | 233 | 264 | 1,260 | 800 | 173 | 3,350 | 40 | 1,520 | 15 | 41 |
| 28.. | 183 | 113 | 3,900 | 233 | 1,720 | 750 | 173 | 3,170 | 54 | 1,390 | 15 | 40 |
| 29.. | 183 | 113 | 2,510 | 309 | ..... | 605 | 800 | 4,670 | 520 | 1,320 | 15 | 36 |
| 30.. | 88 | 100 | 905 | 652 | ..... | 480 | 800 | 3,170 | 480 | 1,080 | 22 | 36 |
| 31.. | 88 | ..... | 520 | 905 | ..... | 225 | ..... | 1,260 | ..... | 135 | 40 | ..... |

"NOTE—Daily discharge estimated because of ice from climatic data and observer's notes Dec. 13-20, Feb. 6-16, braced figures show the mean discharge for the period. Discharge interpolated June 19, Aug. 4."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1917.

(Drainage area, 210 square miles.)

| Month | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum | Minimum | Mean. | Per square mile | |
| October | 605 | 78 | 267 | 1.27 | 1.46 |
| November | 144 | 39 | 74.4 | 0.354 | 0.40 |
| December | 3,900 | ..... | 534 | 2.54 | 2.93 |
| January | 6,330 | 113 | 821 | 3.91 | 4.51 |
| February | 2,000 | ..... | 652 | 3.11 | 3.24 |
| March | 12,300 | 225 | 2,030 | 9.67 | 11.15 |
| April | 905 | 173 | 501 | 2.39 | 2.67 |
| May | 4,670 | 120 | 789 | 3.76 | 4.34 |
| June | 1,020 | 30 | 277 | 1.32 | 1.47 |
| July | 1,590 | 30 | 352 | 1.68 | 1.94 |
| August | 260 | 15 | 59.8 | 0.285 | 0.33 |
| September | 1,460 | 3 | 153 | 0.729 | 0.81 |
| The year | 12,300 | 3 | 545 | 2.60 | 35.25 |

## Discharge Measurements of Shavers Fork at Parsons, W. Va., 1918-1920.

| Date. | Made by— | Gage height. | Dis-charge. |
|---|---|---|---|
| 1918. | | Feet. | Sec.-ft. |
| April 30.. | B. L. Hopkins.................... | 3.84 | 461 |
| May 1.... | B. L. Hopkins.................... | 3.79 | 445 |
| 1920. | | | |
| May 19... | Peterson and Bigwood............. | 3.63 | 390 |
| June 18... | B. L. Bigwood.................... | 3.42 | 266 |
| June 19... | B. L. Bigwood.................... | 3.30 | 196 |
| Nov. 15... | Bigwood and Lamoureux........... | 2.98 | 78.3 |

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1918.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 72 | 905 | 400 | 140 | 800 | 295 | 274 | 480 | 504 | 2,070 | 146 | 1,260 |
| 2.. | 74 | 643 | 500 | 130 | 852 | 260 | 225 | 365 | 365 | 1,140 | 135 | 380 |
| 3.. | 34 | 652 | 400 | 120 | 776 | 173 | 480 | 365 | 309 | 634 | 135 | 204 |
| 4.. | 34 | 365 | 365 | 110 | 700 | 1,260 | 700 | 365 | 215 | 425 | 135 | 225 |
| 5.. | 38 | 135 | 425 | 100 | 605 | 1,140 | 440 | 295 | 225 | 351 | 61 | 281 |
| 6.. | 56 | 146 | 425 | 110 | 662 | 1,140 | 380 | 281 | 165 | 260 | 44 | 464 |
| 7.. | 56 | 146 | 253 | 120 | 800 | 2,830 | 295 | 295 | 173 | 365 | 61 | 225 |
| 8.. | 34 | 120 | 225 | 130 | 1,320 | 1,790 | 365 | 1,790 | 562 | 183 | 76 | 135 |
| 9.. | 39 | 135 | 210 | 120 | 3,170 | 700 | 3,350 | 1,590 | 480 | 159 | 80 | 158 |
| 10.. | 38 | 135 | 170 | 120 | 1,390 | 700 | 1,520 | 905 | 199 | 154 | 80 | 173 |
| 11.. | 60 | 135 | 160 | 130 | 1,520 | 800 | 1,210 | 681 | 154 | 123 | 46 | 143 |
| 12.. | 56 | 87 | 140 | 130 | 1,660 | 800 | 905 | 520 | 135 | 110 | 46 | 135 |
| 13.. | 46 | 135 | 110 | 140 | 2,510 | 4,870 | 652 | 624 | 111 | 80 | 295 | 99 |
| 14.. | 25 | 92 | 100 | 140 | 2,830 | 5,270 | 520 | 1,790 | 87 | 80 | 260 | 365 |
| 15.. | 55 | 104 | 100 | 140 | 3,530 | 3,530 | 1,930 | 1,260 | 61 | 135 | 588 | 295 |
| 16.. | 46 | 80 | 82 | 140 | 4,670 | 1,660 | 2,220 | 800 | 80 | 72 | 605 | 129 |
| 17.. | 58 | 82 | 110 | 140 | 3,530 | 1,260 | 1,930 | 700 | 225 | 80 | 135 | 225 |
| 18.. | 33 | 104 | 110 | 130 | 1,020 | 852 | 1,590 | 537 | 905 | 102 | 173 | 1,020 |
| 19.. | 65 | 104 | 104 | 130 | 905 | 1,020 | 1,020 | 605 | 960 | 80 | 960 | 700 |
| 20.. | 1,790 | 70 | 110 | 130 | 6,330 | 1,660 | 800 | 750 | 520 | 85 | 456 | 960 |
| 21.. | 974 | 72 | 104 | 120 | 3,900 | 1,140 | 905 | 700 | 154 | 80 | 267 | 1,390 |
| 22.. | 158 | 63 | 82 | 120 | 1,930 | 1,520 | 1,930 | 496 | 852 | 154 | 173 | 1,390 |
| 23.. | 135 | 61 | 135 | 120 | 1,260 | 750 | 1,140 | 700 | 700 | 120 | 135 | 440 |
| 24.. | 116 | 70 | 139 | 110 | 1,020 | 700 | 960 | 860 | 562 | 116 | 99 | 169 |
| 25.. | 135 | 70 | 400 | 110 | 1,080 | 800 | 700 | 2,510 | 480 | 126 | 80 | 410 |
| 26.. | 120 | 61 | 1,390 | 200 | 8,220 | 700 | 1,020 | 4,090 | 2,070 | 104 | 80 | 267 |
| 27.. | 135 | 55 | 1,020 | 300 | 2,220 | 546 | 905 | 1,590 | 1,390 | 70 | 80 | 246 |
| 28.. | 135 | 46 | 700 | 2,830 | 520 | 425 | 800 | 1,520 | 624 | 61 | 76 | 267 |
| 29.. | 571 | 200 | 300 | 2,670 | ..... | 295 | 681 | 800 | 2,830 | 80 | 80 | 253 |
| 30.. | 750 | 300 | 170 | 1,660 | ..... | 199 | 546 | 605 | 1,020 | 80 | 80 | 154 |
| 31.. | 960 | ..... | 150 | 852 | ..... | 199 | ..... | 554 | ..... | 104 | 80 | ..... |

"NOTE—Discharge estimated because of ice Dec. 9-15 and Dec. 28 to Jan. 27. Discharge for Nov. 29 to Dec. 3 estimated by comparison with records for station on Cheat River because of apparent error in observer's readings. Discharge interpolated Oct. 21, Feb. 3, Apr. 11, and June 13-14 because of missing gage readings."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1918.

(Drainage area, 210 square miles).

| Month | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum | Minimum | Mean. | Per square mile | |
| October | 1790 | 25 | 223 | 1.06 | 1.22 |
| November | 905 | 46 | 179 | 0.852 | 0.95 |
| December | 1390 | 82 | 293 | 1.40 | 1.61 |
| January | 2830 | 100 | 376 | 1.79 | 2.06 |
| February | 8220 | 520 | 2130 | 10.10 | 10.52 |
| March | 5270 | 173 | 1270 | 6.05 | 6.98 |
| April | 3350 | 225 | 1010 | 4.81 | 5.37 |
| May | 4090 | 281 | 947 | 4.51 | 5.20 |
| June | 2830 | 61 | 571 | 2.72 | 3.04 |
| July | 2070 | 61 | 251 | 1.20 | 1.38 |
| August | 960 | 44 | 185 | 0.881 | 1.02 |
| September | 1390 | 99 | 419 | 2.00 | 2.23 |
| The year | 8220 | 25 | 644 | 3.07 | 41.58 |

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1919.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 123 | 2,360 | 295 | 7,260 | 300 | 1,930 | 440 | 520 | 198 | 236 | 222 | 222 |
| 2.. | 104 | 1,930 | 440 | 5,070 | 300 | 1.020 | 365 | 700 | 245 | 124 | 245 | 158 |
| 3.. | 104 | 1,930 | 440 | 4,280 | 440 | 700 | 245 | 520 | 236 | 124 | 198 | 141 |
| 4.. | 99 | 652 | 440 | 1,720 | 272 | 624 | 300 | 520 | 158 | 98 | 212 | 98 |
| 5.. | 80 | 440 | 295 | 700 | 245 | 605 | 440 | 313 | 158 | 98 | 226 | 158 |
| 6.. | 104 | 246 | 225 | 800 | 245 | 1,720 | 440 | 245 | 141 | 98 | 240 | 76 |
| 7.. | 104 | 281 | 365 | ..... | 245 | 1,660 | 365 | 256 | 98 | 98 | 222 | 98 |
| 8.. | 104 | 225 | 440 | ..... | 229 | 700 | 365 | 300 | 98 | 94 | 245 | 111 |
| 9.. | 97 | 225 | 700 | ..... | 212 | 520 | 272 | 440 | 141 | 94 | 245 | 124 |
| 10.. | 80 | 225 | 5,890 | ..... | 195 | 520 | 245 | 1,790 | 111 | 119 | 198 | 66 |
| 11.. | 225 | 295 | 3,350 | ..... | 178 | 700 | 313 | 1,260 | 111 | 98 | 245 | 106 |
| 12.. | 225 | 199 | 2,220 | ..... | 198 | 624 | 365 | 605 | 98 | 87 | 222 | 66 |
| 13.. | 173 | 135 | 2,830 | ..... | 198 | 520 | 365 | 800 | 76 | 98 | 158 | 98 |
| 14.. | 173 | 135 | 2,510 | ..... | 365 | 520 | 440 | 700 | 87 | 605 | 158 | 98 |
| 15.. | 154 | 143 | 1,930 | ..... | 300 | 365 | 365 | 700 | 87 | 624 | 158 | 98 |
| 16.. | 80 | 150 | 1,720 | ..... | 245 | 365 | 440 | 520 | 520 | 3,900 | 178 | 76 |
| 17.. | 80 | 295 | 1,520 | ..... | 198 | 365 | 605 | 520 | 402 | 2,510 | 198 | 76 |
| 18.. | 80 | 183 | 700 | 300 | 158 | 852 | 652 | 480 | 300 | 1,260 | 158 | 98 |
| 19.. | 67 | 225 | 520 | 365 | 158 | 605 | 605 | 605 | 198 | 700 | 144 | 98 |
| 20.. | 61 | 1,080 | 480 | 562 | 198 | 300 | 562 | 700 | 158 | 3,530 | 158 | 40 |
| 21.. | 104 | 905 | 440 | 652 | 272 | 605 | 440 | 800 | 124 | 1,930 | 144 | 76 |
| 22.. | 80 | 905 | 700 | 790 | 300 | 520 | 365 | 905 | 124 | 1,200 | 124 | 98 |
| 23.. | 110 | 295 | 2,220 | 605 | 300 | 520 | 365 | 605 | 158 | 700 | 158 | 158 |
| 24.. | 135 | 295 | 1,930 | 3,000 | 440 | 365 | 480 | 562 | 158 | 440 | 150 | 272 |
| 25.. | 605 | 295 | 1,590 | 1,390 | 520 | 313 | 365 | 440 | 158 | 300 | 141 | 440 |
| 26.. | 905 | 150 | 800 | 700 | 852 | 300 | 300 | 520 | 624 | 245 | 141 | 158 |
| 27.. | 700 | 104 | 652 | 652 | 1,320 | 605 | 300 | 681 | 520 | 198 | 158 | 98 |
| 28.. | 602 | 135 | 562 | 605 | 700 | 1,520 | 300 | 425 | 1,520 | 289 | 108 | 124 |
| 29.. | 504 | 1,660 | 440 | 652 | ..... | 1,200 | 289 | 352 | 960 | 245 | 98 | 103 |
| 30.. | 1,460 | 800 | 365 | 440 | ..... | 700 | 365 | 245 | 504 | 182 | 98 | 76 |
| 31.. | 3,530 | ..... | 605 | 245 | ..... | 700 | ..... | 245 | ..... | 245 | 141 | ..... |

"NOTE—Discharge interpolated Oct. 28, Aug. 4-5 and 24 because of missing gage readings. Discharge estimated as in table because of ice for Feb. 8-10; estimated as 320 second-feet Jan. 7-17 because of ice."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1919.

(Drainage area, 210 square miles.)

| Month | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum | Minimum | Mean. | Per square mile | |
| October | 3,530 | 61 | 357 | 1.70 | 1.96 |
| November | 2,360 | 104 | 563 | 2.68 | 2.99 |
| December | 5,890 | 225 | 1,210 | 5.76 | 6.64 |
| January | 7,260 | ..... | 1,100 | 5.24 | 6.04 |
| February | 1,320 | 158 | 342 | 1.63 | 1.70 |
| March | 1,930 | 300 | 728 | 3.47 | 4.00 |
| April | 652 | 245 | 392 | 1.87 | 2.09 |
| May | 1,790 | 245 | 589 | 2.80 | 3.23 |
| June | 1,520 | 76 | 282 | 1.34 | 1.50 |
| July | 3,900 | 87 | 664 | 3.16 | 3.64 |
| August | 245 | 98 | 177 | 0.843 | 0.97 |
| September | 440 | 40 | 124 | 0.59 | 0.66 |
| The year | 7,260 | 40 | 549 | 2.61 | 35.42 |

## Daily Discharge, in second-feet, of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1920.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 98 | 3,530 | 700 | ..... | 198 | ..... | 440 | 504 | 245 | 96 | 124 | 116 |
| 2.. | 98 | 4,670 | 571 | ..... | 198 | ..... | 480 | 700 | 222 | 91 | 119 | 111 |
| 3.. | 76 | 1,390 | 300 | ..... | ..... | ..... | 365 | 562 | 245 | 194 | 119 | 91 |
| 4.. | 111 | 1,140 | 272 | ..... | ..... | ..... | 365 | 440 | 440 | 1,660 | 114 | 116 |
| 5.. | 98 | 300 | 272 | ..... | ..... | ..... | 520 | 410 | 1,020 | 418 | 103 | 116 |
| 6.. | 48 | 520 | 1,460 | ..... | ..... | ..... | 480 | 300 | 700 | 358 | 101 | 103 |
| 7.. | 76 | 425 | 7,260 | ..... | ..... | ..... | 480 | 272 | 496 | 294 | 101 | 80 |
| 8.. | 98 | 245 | 3,530 | ..... | ..... | ..... | 562 | 300 | 365 | 267 | 106 | 62 |
| 9.. | 124 | 198 | 1,140 | 3,710 | ..... | ..... | 624 | 300 | 245 | 174 | 94 | 56 |
| 10.. | 158 | 222 | 700 | 2,670 | ..... | ..... | 605 | 245 | 222 | 155 | 101 | 70 |
| 11.. | 158 | 245 | 605 | 2,360 | ..... | ..... | 605 | 256 | 158 | 500 | 106 | 91 |
| 12.. | 48 | 236 | 1,260 | 1,390 | ..... | ..... | 440 | 605 | 178 | 905 | 250 | 91 |
| 13.. | 1,140 | 245 | 2,220 | 365 | ..... | 7,260 | 1,790 | 1,790 | 170 | 432 | 350 | 134 |
| 14.. | 1,590 | 222 | 2,670 | ..... | ..... | 4,870 | 1,200 | 2,220 | 158 | 240 | 124 | 91 |
| 15.. | 2,220 | 178 | 1,790 | ..... | ..... | 1,520 | 905 | 1,660 | 480 | 231 | 103 | 80 |
| 16.. | 1,520 | 198 | 1,140 | ..... | ..... | 1,930 | 700 | 1,260 | 365 | 528 | 326 | 70 |
| 17.. | 605 | 222 | 852 | ..... | ..... | 4,670 | 1,590 | 440 | 300 | 272 | 262 | 60 |
| 18.. | 520 | 178 | ..... | ..... | ..... | 4,470 | 1,020 | 425 | 272 | 155 | 203 | 50 |
| 19.. | 520 | 158 | ..... | ..... | ..... | 5,890 | 852 | 418 | 194 | 151 | 537 | 74 |
| 20.. | 440 | 124 | ..... | ..... | ..... | 5,470 | 1,590 | 554 | 155 | 151 | 1,080 | 74 |
| 21.. | 520 | 158 | ..... | ..... | ..... | 1,930 | 4,870 | 520 | 203 | 151 | 852 | 50 |
| 22.. | 1,720 | 272 | ..... | 2,830 | ..... | 1,520 | 4,280 | 440 | 346 | 151 | 537 | 42 |
| 23.. | 1,660 | 272 | ..... | 5,470 | ..... | 634 | 3,170 | 388 | 358 | 127 | 1,080 | 35 |
| 24.. | 2,220 | 166 | ..... | 5,070 | 2,070 | 605 | 2,510 | 365 | 284 | 212 | 690 | 35 |
| 25.. | 1,260 | 402 | ..... | 1,930 | 1,020 | 562 | 1,930 | 440 | 190 | 1,020 | 432 | 42 |
| 26.. | 1,320 | 2,220 | ..... | 1,140 | 700 | 562 | 1,080 | 267 | 170 | 700 | 332 | 35 |
| 27.. | 1,260 | 1,930 | ..... | 700 | 520 | 520 | 750 | 245 | 217 | 365 | 240 | 35 |
| 28.. | 1,020 | 1,520 | ..... | 365 | ..... | 520 | 905 | 212 | 116 | 236 | 194 | 226 |
| 29.. | 800 | 1,390 | ..... | 272 | ..... | 605 | 700 | 207 | 101 | 170 | 186 | 278 |
| 30.. | 300 | 1,020 | ..... | 245 | ..... | 440 | 520 | 245 | 96 | 138 | 170 | 410 |
| 31.. | 700 | ..... | ..... | 198 | ..... | 402 | ..... | 222 | ..... | 106 | 148 | ..... |

"NOTE.—Discharge estimated because of ice as follows: Dec. 18-26, 250 second-feet; Dec. 27-Jan. 8, as 80 second-feet; Jan. 14-21 as 200 second-feet; Feb. 3-23 as 210 second-feet and Feb. 28 to Mar. 12 as 250 second-feet. Discharge estimated July 11 and Aug. 12-13 because of missing gage heights."

## Monthly Discharge of Shavers Fork at Parsons, W. Va., for the Year ending September 30, 1920.

(Drainage area, 210 square miles.)

| Month | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum | Minimum | Mean. | Per square mile | |
| October ........... | 2,220 | 48 | 731 | 3.48 | 4.01 |
| November .......... | 4,670 | 124 | 890 | 3.81 | 4.25 |
| December ........... | 7,260 | ..... | 955 | 4.55 | 5.25 |
| January ............ | 5,470 | ..... | 999 | 4.76 | 5.49 |
| February ........... | 2,070 | ..... | 332 | 1.58 | 1.70 |
| March .............. | 7,260 | ..... | 1,530 | 7.29 | 8.40 |
| April .............. | 4,870 | 365 | 1,210 | 5.76 | 6.43 |
| May ................ | 2,220 | 207 | 555 | 2.64 | 3.04 |
| June ............... | 1,020 | 96 | 290 | 1.38 | 1.54 |
| July ............... | 1,660 | 91 | 343 | 1.63 | 1.88 |
| August ............ | 1,080 | 94 | 299 | 1.42 | 1.64 |
| September .......... | 410 | 35 | 97.5 | 0.464 | 0.52 |
| The year ....... | 7,260 | 35 | 681 | 3.24 | 44.15 |

**Haddix Run.**—Haddix Run rises in Tucker County 2.2 miles northeast of Montrose, at an elevation of 2,150 feet, flows eastward and southeastward, and empties into Shavers Fork at Porterwood, at an elevation of 1,700 feet, its total length being 5.5 miles and its total fall 450 feet, its principal tributary being South Branch. The area of its drainage basin is 8.55 square miles. With the exception of a few cleared farms located along its lower course almost its entire watershed is covered with cut-over woodland.

**Laurel Run.**—Laurel Run rises in Tucker County 2 miles east of Montrose, at an elevation of 2,225 feet, flows southeastward and empties into Shavers Fork 1.8 miles southwest of Porterwood, at an elevation of 1,750 feet, its total length being 3.4 miles and its total fall 475 feet. The area of its drainage basin is 3.37 square miles. Almost its entire watershed is covered with cut-over woodland.

**Pheasant Run.**—Pheasant Run rises in Randolph County 2 miles west of Pettit, at an elevation of 2,475 feet, flows generally northeastward and empties into Shavers Fork 2.1 miles southwest of Porterwood, at an elevation of 1,750 feet, its total length being 3.8 miles and its total fall 725 feet. The area of its drainage basin is 7.73 square miles. A large portion of its watershed is covered with virgin or cut-over woodland, there being a small amount of cleared land, devoted to grazing and agriculture, along the valley.

## Dry Fork of Cheat River.

Dry Fork of Cheat River rises in Randolph County 2 miles northwest of Osceola, at an elevation of 3,800 feet, flows generally northeastward to Elklick, and thence northwestward to Parsons, where it unites with Shavers Fork to form Cheat River, its total length being 36.8 miles and its total fall 2,175 feet. The area of its total drainage basin is 499.85 square miles and of that portion above the Tucker-Randolph Line, excluding tributaries which empty below the mouth of Red Creek, 112.66 square miles. It enters Tucker County at the mouth of Red Creek, near Dry Fork Post-office, at which point its elevation is 2,150 feet, the total length in Tucker County being 22.8 miles and the total fall 525 feet. In the vicinity of the Tucker-Randolph Line there are numerous meanders, preserved from the time of the so-called Cretaceous Peneplain. Most of its course in Tucker County is between lofty mountains, covered with cut-over woodland, there being only a comparatively small amount of land along its narrow valley and on some of the upland limestone slopes devoted to agriculture and grazing. In Randolph County, however, there is a larger proportion of cleared land, as the limestone deposits become thicker and cover a more extensive territory. Two of its large tributaries, Laurel Fork and Glady Fork, are but sparsely inhabited, still containing a large amount of virgin woodland.

Its principal tributaries emptying in Tucker County, in ascending order, are Falls Run and Elklick Run (at Hambleton), Blackwater River, Otter Creek, Red Run, Mill Run, Elklick Run (at Elklick), Glady Fork, Big Run, Laurel Fork, and Red Creek.

**Elklick Run (at Hambleton).**—Elklick Run (at Hambleton) rises in Tucker County 2 miles northeast of Pettit, at an elevation of 2,525 feet, flows generally northeastward, and empties into Dry Fork at Hambleton, at an elevation of 1,700 feet, its total length being 4.4 miles and its total fall 825 feet. The area of its drainage basin is 6.19 square miles. Almost its total area is included within the Monongahela National Forest, being entirely covered with cut-over woodland, and practically uninhabited.

**Blackwater River.**—Blackwater River, emptying into Dry Fork at Hendricks, will be described under a subsequent heading.

**Otter Creek.**—Otter Creek rises in Randolph County 3.5 miles northeast of Bowden, at an elevation of 3,500 feet, flows northeastward, thence northwestward, and thence eastward and empties into Dry Fork at Otter Station, at an elevation of 1,810 feet, its total length being 11.5 miles and its total fall 1,690 feet. It enters Tucker County 3.3 miles, air-line measure) southwest of Otter Station, its elevation at the county line being 2,450 feet. Its total length within the county is 5.3 miles and its total fall 640 feet. The area of its total drainage basin is 26.14 square miles and of that portion above the Tucker-Randolph Line 14.68 square miles. Its course is between high mountains, the valley being extremely narrow and the bed of the stream being littered with huge boulders, and there being numerous low cataracts. Its principal tributaries emptying within the county are Coal Run and Turkey Run, both of which are tumultuous mountain torrents. Most of its area is included within the domain of the Monongahela National Forest, being almost entirely covered with cut-over forest, there being a very small amount of cleared land along its lower course.

**Red Run.**—Red Run rises on the western slope of Canaan Mountain 3 miles west of Cortland, at an elevation of 3,500 feet, flows generally westward and empties into Dry Fork 0.9 mile southeast of Otter Station, at an elevation of 1,800 feet, its total length being 7.5 miles and its total fall 1,750 feet. Its entire drainage basin, containing 10.30 square miles, is uninhabited, being covered with cut-over forest. Its stream bed is extremely rough, being littered with huge boulders, and as there is no level ground on either side, its course may be traversed only with great difficulty.

**Mill Run.**—Mill Run rises against Mozark Mountain 1.5 miles northeast of Elk, at an elevation of 2,725 feet, flows generally southward, and empties into Dry Fork at Mill Run Station, at an elevation of 1,900 feet, its total length being 3 miles and its total fall 825 feet. The area of its drainage basin is 3.47 square miles. Its upland slopes are covered with cut-over woodland but along its valley, where there are limestone deposits, the land has been partly cleared for agricultural and grazing purposes.

**Elklick Run (at Elklick).**—Elklick Run (at Elklick) rises against Mozark Mountain, 1.8 miles northeast of Elk, at an elevation of 3,000 feet, flows generally southwestward, and empties into Dry Fork at Elklick Station, at an elevation of 1,900 feet, its total length being 2 miles and its total fall 1,100 feet. The area of its drainage basin is 2.85 square miles. Its upland slopes are covered with cut-over woodland but along its valley, where there are limestone deposits, the land has been partly cleared for agricultural and grazing purposes.

**Glady Fork.**—Glady Fork rises in Randolph County 3¼ miles east of Wildell, at an elevation of 3,500 feet, flows generally northeastward, and empties into Dry Fork at Gladwin, at an elevation of 1,950 feet, its total length being 27.1 miles and its total fall 1,550 feet. The area of its drainage basin is 68.00 square miles. It enters Tucker County 1.4 miles westward from Jenningston, at an elevation of 1,900 feet, its total length within the county being 3.8 miles and the total fall 50 feet. Its watershed is largely covered with virgin or cut-over woodland. At various points in its course there are ancient meanders, preserved from the time of the supposed Cretaceous Peneplain.

**Big Run.**—Big Run rises in the gap between Canaan and and Cabin Mountains, 1.7 miles southwest of Buena, at an elevation of 3,250 feet, flows generally westward and empties into Dry Fork, 0.8 mile northeast of Jenningston, at an elevation of 2,000 feet, its total length being 3 miles and its total fall 1,250 feet. The area of its drainage basin is 4.37 square miles. A portion of its valley, where there is limestone, is cleared and devoted to agriculture and grazing, the remainder being cut-over woodland.

**Laurel Fork.**—Laurel Fork rises in Randolph County just west of Bayards Knob, at an elevation of 4,000 feet, flows generally northeastward, and empties into Dry Fork at Jenningston, at an elevation of 2,325 feet, its total length being 24 miles and its total fall 1,675 feet. The area of its drainage basin is 57.62 square miles. Almost its entire watershed lies within

Randolph County, its mouth being at the line between that county and Tucker. Its basin is almost totally uninhabited, being covered with virgin or cut-over woodland. There are numerous meanders, preserved from the time of the supposed Cretaceous Peneplain.

**Red Creek.**—Red Creek rises in Tucker County in the glades just east of Cabin Mountain, at an elevation of 3,990 feet, flows southward, southwestward, and westward, and empties into Dry Fork 0.4 mile northwest of Dry Fork Post-office, at an elevation of 2,150 feet, its total length being 20.4 miles and its total fall 1,840 feet. The area of its drainage basin is 68.36 square miles of which 27.63 square miles is in Randolph County. Its principal tributaries are Gandy Creek, Right Fork, Little Stonecoal, Fisher Lower Spring, and Fisher Spring Runs, Left Fork, and Alder Run. Above Laneville, its watershed is totally uninhabited, being covered with cut-over woodland, but below Laneville there is a considerable amount of limestone land that is cleared and devoted to agriculture and grazing.

## Blackwater River.

The Blackwater River rises between Canaan and Cabin Mountains 1 mile westward from Buena, at an elevation of 3,250 feet, flows southeastward to Freeland Run, thence generally northeastward to Little Blackwater River, and thence southwestward, and empties into Dry Fork of Cheat River at Hendricks, at an elevation of 1,705 feet, its total length being 30.6 miles and its total fall 1,545 feet. The area of its drainage basin is 141.77 square miles. Its principal tributaries, in ascending order, are Big and Tub Runs, North Fork, Pendleton and Beaver Creeks, Devils Run, Yellow Creek, Little Blackwater River, North Branch, Sand Yokum, Freeland, Cub, and Mill Runs. A portion of its drainage basin in the vicinity of Davis is cleared and devoted to agriculture and grazing, and in the Canaan Valley, along its upper course above Davis, there is a large amount of cleared and highly fertile land, devoted to agriculture and grazing.

The Canaan Valley embraces the land lying on either side of Blackwater River above the mouth of the Little Blackwater, as well as the valley of the latter stream, being 13 miles long and 2 to 3 miles wide, consisting mainly of wide bottoms and glades, broken by a low range of flat hills just east of the Blackwater. Its peculiar existence seems to be primarily due to the fact that the main sediments consist of soft shales and limestone that have been easily eroded, the floor of the valley being preserved by the hard rocks of the Pottsville Series which dip down to drainage and form an effectual dam at the gap where the Blackwater flows between Brown and Canaan Mountains. It is possible, also, as previously mentioned on page 21, that the valley is a reflection of the supposed Tertiary Peneplain of early days.

In the Canaan Valley the Blackwater River is almost completely base-leveled, its rate of fall from its source to the mouth of the Little Blackwater being only 8.3 feet per mile. Between the Little Blackwater River and Beaver Creek its rate is 20 feet per mile. Below the mouth of Beaver Creek the course of the river becomes tumultuous, its rate of fall between that point and North Fork being 136 feet per mile, its bed being littered with huge boulders, and its narrow gorge being almost impossible for human passage. The falls of the river, 1½ miles southwest of Davis, with a total drop of 57 feet, as measured by the writer, have long been known as a scene of impressive beauty. Below North Fork the river continues its rapid course, its rate of fall between that point and Hendricks being 94 feet per mile.

In sharp contrast to the clear waters of Shavers and Dry Forks, the color of the Blackwater is a dark, reddish-brown, apparently due to tannic acid from the hemlock and spruce wood that grows in great abundance in the Canaan Valley combined with iron oxide from the red Mauch Chunk Shales that compose the principal portion of the sedimentary deposits.

A gaging station was established October 13, 1911, in cooperation with the United States Geological Survey, on the Blackwater River at Hendricks, by H. P. Drake, Engineer for the West Virginia Development Company and discontinued September 30, 1918, the observer being paid by the West Virginia Development Company or the Pittsburgh Hydro-Electric Company. Discharge measurements were made at

PLATE III.—Looking east from Backbone Mountain showing junction of Blackwater River (at right) with North Fork of same (at left). Rock outcrops and talus are Pottsville with Homewood Sandstone on rim of plateau. Smooth slope above is made by Allegheny Series. Portion of Mauch Chunk visible in right foreground. Ridge at extreme right rear is Canaan Mountain formed by Pottsville.

the station by the United States Geological Survey in 1916, 1917, 1918, and 1920. The published records of this station are given below, as taken from Water-Supply Papers Nos. 383, 403, 433, and 453 of the former organization. The discharge measurements for 1920 are as given by G. C. Stevens, District Engineer, Water Resources Branch, United States Geological Survey:

## Blackwater River at Hendricks, W. Va.

"**Location.**—At highway bridge at Hendricks, about one-eighth mile above mouth of river.

"**Drainage area.**—148 square miles (determined by West Virginia Development Co.).

"**Records available.**—October 13, 1911, to September 30, 1914.

"**Gage.**—Standard chain gage attached to upstream side of bridge; read morning and evening, as follows: October to December, 1911, to half-tenths; January, 1912, to September, 1914, to tenths.

"**Discharge measurements.**—Made from bridge at all except low stages, when they are made by wading.

"**Channel and control.**—Coarse gravel and stones; may shift slightly during high floods.

"**Winter flow.**—Probably not affected by ice except during extremely cold weather.

"**Accuracy.**—On account of the uncertainty of corrections to gage readings, records from May 1, 1912, to March 31, 1913, may not be as accurate as those for other periods.

"**Cooperation.**—Station maintained and records furnished by the West Virginia Development Co."

## Discharge Measurements of Blackwater River at Hendricks, W. Va., during the Years ending September 30, 1912-1914.

(Made by H. P. Drake[a]).

| Date. | Gage height. | Discharge. |
|---|---|---|
| 1911-12. | Feet. | Sec.-ft. |
| October 13 | 3.02 | 455 |
| December 11 | 2.50 | 192 |
| July 20 | 3.49 | 927 |
| July 20 | 3.56 | 946 |
| 1912-13. | | |
| May 10 | 2.28 | 131 |
| May 10 | 2.28 | 132 |
| June 12 | 2.25 | 127 |
| June 12 | 2.25 | 126 |
| September 5 | 1.77 | 19.4 |
| September 5 | 1.77 | 19.4 |

## Discharge Measurements of Blackwater River at Hendricks, W. Va., during the Years ending September 30, 1912-1914 —(Continued).

| Date. | Gage height | Dis-charge. |
|---|---|---|
| 1913-14. | Feet. | Sec.-ft. |
| October 21 | 3.97 | 1,170 |
| October 21 | 3.97 | 1,180 |
| October 23 | 3.23 | 551 |
| October 23 | 3.23 | 550 |
| November 17 | 5.06 | 3,240 |
| November 17 | 5.06 | 3,210 |
| November 17 | 4.87 | 2,650 |
| November 17 | 4.03 | 1,320 |
| November 18 | 4.03 | 1,320 |
| November 18 | 4.03 | 1.320 |
| March 28 | 5.27 | 3.900 |
| March 28 | 5.27 | 3,900 |
| March 31 | 3.89 | 1,210 |
| March 31 | 3.89 | 1,200 |

[a]Engineer of the West Virginia Development Co.

## Daily Discharge, in second-feet, of Blackwater River at Hendricks, W. Va., for the Years ending Sept. 30, 1912-1914.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1911-12 | | | | | | | | | | | | |
| 1 | ..... | 173 | 200 | 1,200 | 363 | 430 | 559 | 258 | 48 | 69 | 258 | 492 |
| 2 | ..... | 160 | 230 | 559 | 314 | 333 | 559 | 230 | 30 | 58 | 169 | 492 |
| 3 | ..... | 142 | 200 | 461 | 287 | 230 | 842 | 193 | 30 | 48 | 169 | 314 |
| 4 | ..... | 131 | 173 | 384 | 230 | 193 | 709 | 207 | 39 | 69 | 169 | 230 |
| 5 | ..... | 131 | 160 | ..... | ..... | 200 | 526 | 207 | 30 | 69 | 52 | 249 |
| 6 | ..... | 200 | 160 | ..... | ..... | 200 | 752 | 173 | 48 | 461 | 48 | 249 |
| 7 | ..... | 937 | 160 | ..... | ..... | 200 | 1,200 | 200 | 48 | 80 | 52 | 160 |
| 8 | ..... | 492 | 160 | ..... | ..... | 323 | 1,260 | 287 | 48 | 80 | 30 | 145 |
| 9 | ..... | 300 | 173 | ..... | ..... | 752 | 631 | 292 | 48 | 104 | 92 | 117 |
| 10 | ..... | 245 | 183 | ..... | ..... | 430 | 237 | 752 | 30 | 69 | 131 | 104 |
| 11 | ..... | 207 | 193 | ..... | ..... | 287 | 151 | 937 | 145 | 80 | 117 | 92 |
| 12 | ..... | 218 | 200 | ..... | ..... | 278 | 166 | 1,090 | 145 | 595 | 131 | 145 |
| 13 | 430 | 230 | 200 | ..... | ..... | 888 | 193 | 709 | 131 | 492 | 131 | 104 |
| 14 | 384 | 207 | 193 | ..... | ..... | [a]595 | 200 | 314 | 145 | 461 | 131 | 92 |
| 15 | 888 | 207 | 323 | ..... | ..... | 4,080 | 200 | 314 | 145 | 363 | 559 | 117 |
| 16 | 709 | 258 | 842 | ..... | ..... | 2,560 | 230 | 249 | 160 | 211 | 270 | 888 |
| 17 | 461 | 218 | 670 | ..... | ..... | 1,310 | 237 | 595 | 363 | 1,140 | 160 | 249 |
| 18 | 1,890 | 1,140 | 430 | ..... | ..... | 888 | 795 | 292 | 631 | 2,070 | 176 | 193 |
| 19 | 937 | 752 | 237 | ..... | ..... | [a]752 | 709 | 211 | 595 | 1,890 | 292 | 176 |
| 20 | 559 | 1,090 | 173 | 752 | 595 | 1,890 | 300 | 526 | 670 | 752 | 888 | 131 |
| 21 | 413 | 492 | 230 | 419 | 631 | 1,890 | 237 | 176 | 670 | 888 | 338 | 89 |
| 22 | 363 | 237 | 258 | 323 | 937 | 1,890 | 230 | 48 | 709 | 936 | 160 | 48 |
| 23 | 461 | 230 | 1,090 | 287 | 559 | 795 | 278 | 80 | 888 | [b]3,000 | 270 | 314 |
| 24 | 333 | 314 | 559 | 258 | 402 | 1,720 | 245 | 39 | 842 | 1,370 | 270 | 1,640 |
| 25 | 278 | 270 | 492 | 218 | 348 | 1,370 | 200 | 30 | 888 | 2,990 | 193 | 1,720 |

**Daily Discharge, in second-feet, of Blackwater River at Hendricks, W. Va., for the Years ending Sept 30, 1912-1914—(Continued).**

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26..... | 230 | 207 | 795 | 173 | 2,990 | 709 | 193 | 30 | 249 | 2,780 | 230 | 1,040 |
| 27..... | 207 | 230 | 1,570 | 173 | 3,330 | 492 | 258 | 54 | 230 | 338 | 314 | 1,090 |
| 28..... | 200 | 363 | 752 | 207 | 1,430 | 461 | 230 | 52 | 230 | 176 | 249 | 526 |
| 29..... | 183 | 430 | 492 | 631 | 752 | 2,460 | 200 | 52 | 211 | 169 | 1,260 | 419 |
| 30..... | 166 | 222 | 430 | 986 | ..... | 2,560 | 258 | 50 | 211 | 169 | 842 | 492 |
| 31..... | 151 | ..... | 2,460 | 559 | ..... | 752 | ..... | 48 | ..... | 183 | 390 | ..... |
| 1912-13 | | | | | | | | | | | | |
| 1..... | 310 | 128 | 114 | 461 | 795 | 526 | 353 | 262 | 1,570 | 136 | 109 | 25 |
| 2..... | 226 | 190 | 128 | 379 | 282 | 305 | 282 | 204 | 631 | 109 | 109 | 25 |
| 3..... | 190 | 142 | 413 | 842 | 407 | 241 | 241 | 169 | 461 | 109 | 84 | 25 |
| 4..... | 173 | 114 | 266 | 752 | ..... | 222 | 204 | 169 | 300 | 84 | 84 | 25 |
| 5..... | 157 | 102 | 358 | 595 | ..... | 241 | 241 | 169 | 258 | 122 | 62 | 25 |
| 6..... | 142 | 89 | 795 | 1,640 | ..... | 204 | 204 | 139 | 218 | 631 | 62 | 25 |
| 7..... | 142 | 1,040 | 752 | 3,820 | ..... | 154 | 204 | 139 | 258 | 278 | 62 | 122 |
| 8..... | 128 | 1,500 | 526 | 3,820 | ..... | 186 | 169 | 139 | 492 | 122 | 62 | 136 |
| 9..... | 114 | 1,040 | 245 | 1,980 | ..... | 204 | 169 | 112 | 300 | 122 | 62 | 84 |
| 10..... | 114 | 595 | 142 | 670 | ..... | 430 | 169 | 112 | 183 | 2,560 | 42 | 62 |
| 11..... | 102 | 310 | 142 | 937 | 559 | 986 | 222 | 86 | 136 | 631 | 25 | 42 |
| 12..... | 102 | 245 | 142 | 1,370 | 670 | 631 | 305 | 84 | 114 | 323 | 96 | 42 |
| 13..... | 128 | 226 | 142 | 795 | 305 | 353 | 795 | 73 | 136 | 323 | 1,200 | 42 |
| 14..... | 114 | 310 | 142 | 595 | 241 | 1,430 | 461 | 122 | 109 | 2,460 | 323 | 42 |
| 15..... | 114 | 245 | 142 | 379 | 204 | 1,200 | 752 | 348 | 109 | 1,310 | 136 | 42 |
| 16..... | 102 | 190 | 142 | 937 | 186 | 795 | 752 | 373 | 109 | 631 | 84 | 73 |
| 17..... | 89 | 173 | 142 | 842 | 241 | 526 | 461 | 492 | 84 | 1,200 | 84 | 96 |
| 18..... | 89 | 173 | 142 | 752 | 186 | 305 | 353 | 526 | 84 | 1,570 | 62 | 200 |
| 19..... | 157 | 142 | 226 | 595 | 186 | 328 | 282 | 300 | 62 | 709 | 62 | 151 |
| 20..... | 173 | 142 | 173 | 379 | 241 | 222 | 262 | 218 | 62 | 373 | 42 | 109 |
| 21..... | 142 | 142 | 142 | 282 | 492 | 241 | 241 | 237 | 62 | 258 | 62 | 2,070 |
| 22..... | 102 | 142 | 142 | 353 | 595 | 204 | 204 | 595 | 96 | 218 | 136 | 1,430 |
| 23..... | 266 | 142 | 142 | 407 | 430 | 186 | 186 | 2,160 | 278 | 430 | 300 | 492 |
| 24..... | 461 | 142 | 142 | 595 | 328 | 169 | 169 | 2,560 | 559 | 2,070 | 151 | 166 |
| 25..... | 413 | 142 | 114 | 795 | 262 | 169 | 169 | 1,200 | 258 | 795 | 96 | 109 |
| 26..... | 310 | 114 | 114 | 595 | 204 | 461 | 139 | 559 | 166 | 218 | 62 | 84 |
| 27..... | 266 | 114 | 142 | 559 | 282 | 2,990 | 407 | 2,780 | 1,040 | 136 | 42 | 62 |
| 28..... | 226 | 114 | 142 | 353 | 670 | 1,200 | 379 | 2,360 | 430 | 122 | 42 | 62 |
| 29..... | 173 | 114 | 142 | 262 | ..... | 709 | 407 | 1,090 | 218 | 136 | 42 | 42 |
| 30..... | 173 | 114 | 888 | 204 | ..... | 492 | 353 | 670 | 166 | 136 | 42 | 42 |
| 31..... | 142 | ..... | 842 | 1,140 | ..... | 407 | ..... | 3,100 | ..... | 109 | 42 | ..... |

[a]Discharge estimated by adding 1 foot to observer's gage reading.
[b]Discharge estimated.

Daily Discharge, in second-feet, of Blackwater River at Hendrick, W. Va., for the Years ending Sept. 30, 1912-1914 —(Concluded).

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1913-14 | | | | | | | | | | | | |
| 1..... | 109 | 258 | 166 | 160 | 1,200 | 305 | 795 | 348 | 42 | 84 | 136 | 84 |
| 2..... | 166 | 200 | 166 | 160 | 752 | 305 | 3,570 | 278 | 25 | 84 | 109 | 84 |
| 3..... | 1,570 | 166 | 200 | 160 | 430 | 262 | 2,070 | 237 | 25 | 62 | 109 | 62 |
| 4..... | 559 | 200 | 200 | 193 | 358 | 262 | 795 | 218 | 25 | 62 | 84 | 62 |
| 5..... | 430 | 166 | 166 | 160 | 310 | 262 | 402 | 709 | 888 | 42 | 84 | 42 |
| 6..... | 300 | 136 | 166 | 160 | 310 | 186 | 430 | 1,430 | 237 | 42 | 84 | 42 |
| 7..... | 200 | 109 | 2,160 | 160 | 384 | 204 | 373 | 526 | 136 | 42 | 62 | 25 |
| 8..... | 136 | 122 | 1,090 | 160 | 245 | 262 | 526 | 323 | 109 | 25 | 52 | 25 |
| 9..... | 1,310 | 200 | 559 | 363 | 157 | 262 | 461 | 237 | 109 | 25 | 42 | 42 |
| 10..... | 1,200 | 348 | 430 | 1,140 | 207 | 204 | 373 | 200 | 84 | 46 | 42 | 42 |
| 11..... | 526 | 492 | 278 | 492 | 190 | 183 | 323 | 166 | 84 | 39 | 109 | 62 |
| 12..... | 402 | 348 | 278 | 338 | 226 | 151 | 278 | 136 | 62 | 25 | 278 | 109 |
| 13..... | 526 | 1,720 | 237 | 292 | 266 | 151 | 278 | 166 | 62 | 62 | 200 | 84 |
| 14..... | 402 | 5,680 | 237 | 249 | 266 | 151 | 218 | 166 | 42 | 323 | 109 | 62 |
| 15..... | 323 | 4,340 | 200 | 193 | 266 | 258 | 559 | 136 | 42 | 1,090 | 84 | 62 |
| 16..... | 133 | 5.950 | 166 | 176 | 262 | 842 | 2,670 | 136 | 42 | 888 | 84 | 84 |
| 17..... | 136 | 3,100 | 218 | 193 | 262 | 1,500 | 1,310 | 136 | 25 | 559 | 84 | 84 |
| 18..... | 430 | 1,200 | 237 | 160 | 305 | 1,370 | 709 | 109 | 25 | 323 | 84 | 136 |
| 19..... | 526 | 559 | 237 | 193 | 3,330 | 595 | 461 | 84 | 25 | 183 | 62 | 109 |
| 20..... | 1,890 | 430 | 237 | 1,890 | 1,640 | 461 | 1,200 | 84 | 25 | 96 | 62 | 109 |
| 21..... | 1,370 | 373 | 278 | 3,570 | 670 | 348 | 1,200 | 84 | 25 | 62 | 42 | 84 |
| 22..... | 430 | 323 | 278 | 1,370 | 305 | 278 | 559 | 109 | 25 | 62 | 42 | 62 |
| 23..... | 258 | 402 | 300 | 492 | 262 | 258 | 348 | 109 | 84 | 62 | 42 | 84 |
| 24..... | 1,890 | 348 | 373 | 670 | 262 | 402 | 258 | 84 | 278 | 73 | 25 | 109 |
| 25..... | 2,070 | 278 | 323 | 1,260 | 305 | 595 | 278 | 84 | 200 | 166 | 42 | 84 |
| 26..... | 1,040 | 237 | 461 | 631 | 305 | 2,780 | 3,820 | 84 | 122 | 109 | 136 | 62 |
| 27..... | 461 | 200 | 278 | 595 | 305 | 2,560 | 1,890 | 62 | 84 | 166 | 166 | 62 |
| 28..... | 373 | 200 | 183 | 888 | 305 | 3,570 | 709 | 62 | 62 | 1,640 | 136 | 42 |
| 29..... | 323 | 166 | 166 | 1,200 | ..... | 2,260 | 492 | 62 | 62 | 631 | 200 | 42 |
| 30..... | 402 | 166 | 136 | 1,200 | ..... | 1,260 | 402 | 42 | 42 | 237 | 278 | 42 |
| 31..... | 348 | ..... | 166 | 1,260 | ..... | 986 | ..... | 42 | ..... | 166 | 136 | ..... |

"NOTE.—Daily discharge determined from a rating curve well defined between 25 and 4,340 second-feet. Discharge estimated, because of ice, from gage heights, observer's notes, and climatic records, as follows: Jan. 5-19, 1912, 300 second-feet; Feb. 5-19, 1912, 200 second-feet, Feb. 4-10, 1913, 260 second-feet."

## Monthly Discharge of Blackwater River at Hendricks, W. Va., for the Years ending, September 30, 1912-1914.

(Drainage area, 148 square miles).

| Month | Discharge in second-feet. Maximum | Minimum | Mean. | Per square mile | Run-off (depth in inches on drainage area). | Accuracy |
|---|---|---|---|---|---|---|
| 1911-12 | | | | | | |
| October 13-31.. | 1,890 | 151 | 486 | 3.29 | 2.32 | B. |
| November .... | 1,140 | 131 | 348 | 2.35 | 2.62 | A. |
| December ..... | 2,460 | 160 | 464 | 3.14 | 3.62 | B. |
| January ...... | ..... | ..... | 390 | 2.64 | 3.04 | C. |
| February ...... | 3,330 | ..... | 558 | 3.77 | 4.07 | C. |
| March........ | 4,080 | 193 | 1,030 | 6.96 | 8.02 | B. |
| April ........ | 1,260 | 151 | 426 | 2.88 | 3.21 | B. |
| May ......... | 1,090 | 30 | 280 | 1.89 | 2.18 | |
| June ......... | 888 | 30 | 289 | 1.95 | 2.18 | |
| July ......... | [a] 3,000 | 48 | 716 | 4.84 | 5.58 | |
| August ....... | 1,260 | 30 | 276 | 1.86 | 2.14 | |
| September .... | 1,720 | 48 | 404 | 2.73 | 3.05 | |
| 1912-13 | | | | | | |
| October ...... | 461 | 89 | 179 | 1.21 | 1.40 | |
| November ..... | 1,500 | 89 | 279 | 1.89 | 2.11 | |
| December ..... | 888 | 114 | 265 | 1.79 | 2.06 | |
| January ...... | 3,820 | 204 | 906 | 6.12 | 7.06 | |
| February ...... | 795 | ..... | 342 | 2.31 | 2.40 | |
| March ........ | 2,990 | 154 | 539 | 3.64 | 4.20 | |
| April ........ | 795 | 139 | 318 | 2.15 | 2.40 | |
| May ......... | 3,100 | 73 | 695 | 4.70 | 5.42 | B. |
| June ......... | 1,570 | 62 | 298 | 2.01 | 2.24 | A. |
| July ......... | 2,560 | 84 | 595 | 4.02 | 4.64 | A. |
| August ....... | 1,200 | 25 | 125 | 0.845 | 0.97 | B. |
| September .... | 2,070 | 25 | 198 | 1.34 | 1.50 | A. |
| The year.. | 3,820 | 25 | 397 | 2.68 | 36.40 | B. |
| 1913-14 | | | | | | |
| October ...... | 2,070 | 109 | 654 | 4.42 | 5.10 | B. |
| November ..... | 5,950 | 109 | 947 | 6.40 | 7.14 | A. |
| December ..... | 2,160 | 136 | 341 | 2.30 | 2.65 | B. |
| January ...... | 3,570 | 160 | 649 | 4.39 | 5.06 | B. |
| February ..... | 3,330 | 157 | 503 | 3.40 | 3.54 | C. |
| March ....... | 3,570 | 151 | 757 | 5.11 | 5.89 | B. |
| April ......... | 3,820 | 218 | 925 | 6.25 | 6.97 | B. |
| May ......... | 1,430 | 42 | 214 | 1.45 | 1.67 | A. |
| June ....... .. | 888 | 25 | 103 | 0.696 | 0.78 | B. |
| July ... .... | 1,640 | 25 | 241 | 1.63 | 1.88 | B. |
| August ........ | 278 | 25 | 103 | 0.696 | 0.80 | A. |
| September ..... | 136 | 25 | 69.5 | 0.47 | 0.52 | A. |
| The yetr.. | 5,950 | 25 | 458 | 3.09 | 42.00 | |

[a]Estimated.

"A", within 5 per cent; "B", within 10 per cent; "C", within 15 per cent.

The following remarks concerning the gaging records for the year 1915 are taken from Water-Supply Paper 403, pages 36-37:

"**Gage.**—Chain gage attached to upstream side of bridge; read morning and evening, to tenths, by J. W. Ramsey and French Shaffer.

"**Extremes of discharge.**—Maximum stage recorded during year, 6.8 feet at 8 a. m. February 2 (discharge, estimated by extending the rating curve, 7,840 second-feet); minimum stage, 1.8 feet at 5 p. m. June 27 and 7 a. m. and 5 p. m. June 28 (discharge estimated at 25 second-feet).

"1911-1915: Maximum stage recorded, 6.8 feet at 8 a. m. February 2, 1915 (discharge estimated at 7,840 second-feet); minimum stage, 1.8 feet August 11, September 1-6, 1913; June 2-4, 17-22, July 8-9, 12, August 24, September 7-8, 1914; June 27-28, 1915 (discharge estimated at 25 second-feet).

"Maximum flood occurred July 10. 1888, stage unknown.

"**Accuracy.**—Station was first visited by engineers of the Survey in March, 1916. Discharge measurements made at gage heights 3.42 and 4.27 during this visit and computed before the publication of this report plot respectively 17 and 30 per cent. small of the rating curve used from 1911 to 1914. It is believed that monthly discharges as published in Water-Supply Paper 383 are probably as accurate as indicated. Discharge data for 1915 are withheld for additional information.

"No discharge measurements were made at this station during the year."

## Daily Gage Height, in feet, of Blackwater River at Hendricks, W. Va., for the Year ending September 30, 1915.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 1.90 | 2.18 | 2.30 | 3.3 | 6.4 | 2.55 | 2.45 | 2.45 | 2.75 | 2.05 | 2.00 | 2.45 |
| 2.. | 1.90 | 2.10 | 2.40 | 2.80 | 6.7 | 2.35 | 2.80 | 2.45 | 3.8 | 2.00 | 2.00 | 2.55 |
| 3.. | 1.90 | 2.02 | 2.58 | 2.60 | 5.4 | 2.35 | 2.70 | 2.45 | 3.85 | 2.00 | 3.95 | 2.50 |
| 4.. | 1.90 | 1.95 | 2.90 | 2.60 | 4.4 | 2.30 | 2.35 | 2.45 | 3.35 | 2.00 | 3.15 | 2.35 |
| 5.. | 1.90 | 1.95 | 2.80 | 2.60 | 3.6 | 2.30 | 2.35 | 2.80 | 2.95 | 1.90 | 2.55 | 2.30 |
| 6.. | 1.90 | 1.95 | 2.60 | 3.3 | 3.7 | 2.38 | 2.70 | 2.70 | 2.75 | 2.00 | 2.10 | 2.30 |
| 7.. | 1.90 | 1.90 | 2.50 | 6.0 | 3.45 | 2.52 | 3.4 | 2.55 | 2.40 | 2.00 | 1.95 | 2.15 |
| 8.. | 1.90 | 1.90 | 2.60 | 4.8 | 3.15 | 2.38 | 2.75 | 2.50 | 2.50 | 2.00 | 1.95 | 2.20 |
| 9.. | 1.98 | 1.98 | 2.60 | 4.2 | 2.85 | 2.30 | 2.85 | 2.45 | 2.40 | 2.00 | 2.00 | 2.30 |
| 10.. | 1.92 | 1.95 | 2.75 | 3.9 | 2.65 | 2.30 | 2.85 | 2.15 | 2.35 | 2.00 | 2.00 | 2.30 |
| 11.. | 2.00 | 1.95 | 2.55 | 3.75 | 2.60 | 2.30 | 3.25 | 2.35 | 2.10 | 2.00 | 1.95 | 2.15 |
| 12.. | 1.95 | 1.92 | 2.35 | 3.9 | 2.80 | 2.28 | 3.8 | 2.25 | 2.20 | 2.25 | 2.05 | 2.30 |
| 13.. | 1.95 | 1.90 | 2.20 | 3.7 | 3.95 | 2.30 | 3.35 | 2.70 | 2.10 | 2.10 | 2.15 | 2.15 |
| 14.. | 2.18 | 1.90 | 2.18 | 3.35 | 3.9 | 2.35 | 2.85 | 2.45 | 3.75 | 2.05 | 2.00 | 2.20 |
| 15.. | 2.25 | 2.05 | 2.20 | 3.15 | 4.4 | 2.55 | 2.50 | 2.30 | 2.85 | 2.00 | 2.05 | 2.20 |
| 16.. | 2.52 | 2.80 | 2.20 | 3.0 | 3.8 | 2.85 | 2.45 | 2.25 | 2.55 | 2.25 | 1.95 | 2.10 |
| 17.. | 2.40 | 2.50 | 2.20 | 5.1 | 3.00 | 2.65 | 2.70 | 2.20 | 2.35 | 2.45 | 3.3 | 2.00 |
| 18.. | 2.20 | 2.25 | 2.20 | 5.9 | 2.85 | 2.35 | 2.50 | 2.30 | 2.25 | 2.20 | 3.45 | 2.00 |
| 19.. | 2.42 | 2.05 | 2.50 | 4.9 | 2.68 | 2.30 | 2.35 | 2.20 | 2.20 | 2.00 | 2.30 | 5.9 |
| 20.. | 2.25 | 2.40 | 3.3 | 4.35 | 2.60 | 2.20 | 2.60 | 2.20 | 2.10 | 2.05 | 2.25 | 4.7 |
| 21... | 2.12 | 2.40 | 5.6 | 3.3 | 2.52 | 2.20 | 2.40 | 2.25 | 2.10 | 2.10 | 2.20 | 4.5 |
| 22.. | 2.08 | 2.20 | 4.5 | 2.95 | 2.60 | 2.25 | 2.30 | 2.50 | 2.10 | 2.15 | 2.40 | 4.55 |
| 23.. | 2.00 | 1.90 | 3.8 | 2.95 | 2.50 | 2.25 | 2.70 | 2.66 | 2.00 | 2.10 | 2.70 | 3.5 |
| 24.. | 2.00 | 2.00 | 3.2 | 3.15 | 3.35 | 2.22 | 2.50 | 2.55 | 2.00 | 2.10 | 2.45 | 3.45 |
| 25.. | 2.00 | 2.00 | 2.95 | 2.95 | 3.9 | 2.28 | 2.80 | 2.45 | 2.00 | 2.00 | 2.40 | 2.35 |
| 26.. | 2.00 | 2.00 | 2.85 | 2.75 | 2.90 | 3.15 | 2.45 | 2.25 | 2.00 | 1.95 | 2.30 | 2.30 |
| 27.. | 2.02 | 2.00 | 2.70 | 2.60 | 2.70 | 2.85 | 2.30 | 2.30 | 1.85 | 1.90 | 2.25 | 2.60 |
| 28.. | 2.00 | 2.00 | 2.70 | 2.50 | 2.70 | 2.65 | 2.60 | 2.30 | 1.80 | 1.90 | 2.75 | 2.45 |
| 28.. | 1.97 | 1.90 | 2.80 | 2.50 | ..... | 2.70 | 2.50 | 2.30 | 1.90 | 1.90 | 3.45 | 2.30 |
| 30.. | 2.40 | 2.00 | 4.8 | 2.40 | ..... | 2.60 | 2.80 | 4.15 | 1.90 | 1.90 | 3.95 | 2.25 |
| 31.. | 2.25 | ..... | 3.9 | 2.80 | ..... | 2.60 | ..... | 3.75 | ..... | 2.00 | 3.35 | ..... |

"NOTE.—Backwater from ice, Nov. 20-22. Gage read to top of ice Dec. 15-20."

The following data concerning the gaging records of this station for the year 1916 are taken from Water-Supply Paper 433, pages 39-40:

"Gage.—Chain gage attached to upstream side of bridge; read by French Shaffer.

"Extremes of stage.—Maximum stage recorded during year, 7.4 feet at 7 a. m. December 18; minimum stage 1.7 feet at 5 p. m. September 28.

"Accuracy..........Discharge data subsequent to 1914 withheld for additional information. Gage read twice daily to tenths to April 1, then to hundredths."

### Discharge Measurements of Blackwater River at Hendricks, W. Va., for the Year ending September 30, 1916.

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | Feet. | Sec.-ft. |
| Mar. 26... | J. E. Stewart...................... | 3.42 | 616 |
| Mar. 28... | J. E. Stewart...................... | 4.27 | 1,120 |
| Sept. 14.. | L. Lee.............................. | 1.85 | 26.3 |

### Daily Gage Height, in feet, of Blackwater River at Hendricks, W. Va., for the Year ending September 30, 1916.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 7.0 | 2.3 | 2.55 | 4.35 | 4.25 | 2.5 | 2.8 | 2.72 | 2.22 | 2.49 | 1.9 | 1.92 |
| 2.. | 5.4 | 2.25 | 2.6 | 5.8 | 3.65 | 2.55 | 2.78 | 2.69 | 2.18 | 2.5 | 1.92 | 2.08 |
| 3.. | 3.95 | 2.1 | 2.5 | 4.6 | 3.3 | 2.55 | 3.05 | 2.64 | 2.75 | 2.78 | 1.92 | 2.05 |
| 4.. | 3.15 | 2.05 | 2.55 | 3.55 | 2.95 | 2.3 | 3.35 | 2.9 | 2.68 | 2.48 | 1.98 | 1.96 |
| 5.. | 3.25 | 2.35 | 2.45 | 3.0 | 2.9 | 2.3 | 2.92 | 2.68 | 2.4 | 2.28 | 1.97 | 1.92 |
| 6.. | 3.15 | 2.45 | 2.35 | 3.35 | 3.15 | 2.4 | 2.76 | 2.54 | 2.2 | 2.14 | 2.51 | 1.86 |
| 7.. | 2.85 | 2.55 | 2.3 | 3.0 | 4.0 | 5.5 | 2.64 | 3.3 | 2.24 | 2.09 | 2.1 | 1.88 |
| 8.. | 2.6 | 2.6 | 2.25 | 2.65 | 3.55 | 4.45 | 2.58 | 3.05 | 2.46 | 2.09 | 2.04 | 1.94 |
| 9.. | 2.55 | 2.4 | 2.2 | 2.6 | 3.1 | 3.45 | 2.62 | 3.15 | 2.34 | 2.2 | 2.32 | 2.03 |
| 10.. | 2.5 | 2.3 | 2.2 | 2.85 | 2.8 | 3.1 | 2.55 | 2.8 | 2.62 | 2.18 | 2.06 | 2.0 |
| 11.. | 2.55 | 2.2 | 2.1 | 5.4 | 2.55 | 2.85 | 3.35 | 2.67 | 2.5 | 2.17 | 2.0 | 1.99 |
| 12.. | 2.35 | 2.25 | 2.15 | 6.2 | 4.6 | 2.7 | 3.3 | 2.62 | 2.28 | 2.12 | 2.16 | 2.0 |
| 13.. | 2.45 | 2.5 | 2.2 | 5.0 | 6.1 | 2.65 | 3.3 | 2.5 | 2.05 | 2.08 | 3.14 | 1.88 |
| 14.. | 2.35 | 2.55 | 2 2 | 4.2 | 4.45 | 4.85 | 3.25 | 2.4 | 2.18 | 2.4 | 2.86 | 1.86 |
| 15.. | 2.25 | 4.65 | 2.2 | 3.3 | 3.15 | 5.2 | 3.35 | 2.48 | 2.16 | 2.14 | 2.37 | 4.5 |
| 16.. | 2.85 | 3.65 | 2.25 | 3.0 | 2.9 | 3.55 | 2.96 | 2.46 | 2.4 | 2.1 | 2.8 | 2.9 |
| 17.. | 2.35 | 3.2 | 5.05 | 2.85 | 2.9 | 3.1 | 3.1 | 3.26 | 3.65 | 2.75 | 2.52 | 2.42 |
| 18.. | 2.3 | 2.6 | 6.8 | 2.8 | 2.7 | 2.75 | 2.98 | 2.73 | 2.9 | 3.5 | 2.18 | 2.19 |
| 19.. | 4.55 | 3.8 | 4.75 | 2.8 | 2.7 | 2.75 | 2.75 | 2.49 | 2.91 | 2.84 | 2.1 | 2.05 |
| 20.. | 3.8 | 3.65 | 3.75 | 2.9 | 2.65 | 2.7 | 2.65 | 2.4 | 3.0 | 2.26 | 2.1 | 2.0 |
| 21.. | 3.1 | 3.5 | 3.0 | 3.8 | 2.6 | 2.7 | 2.6 | 2.35 | 3.45 | 2.17 | 2.04 | 2.0 |
| 22.. | 2.8 | 3.25 | 2.95 | 3.8 | 2.75 | 5.8 | 3.2 | 2.3 | 3.75 | 2.16 | 2.99 | 1.95 |
| 23.. | 2.5 | 2.95 | 2.8 | 3.7 | 2.7 | 5.2 | 3.0 | 2.66 | 2.95 | 2.14 | 2.45 | 1.97 |
| 24.. | 2.4 | 2.75 | 2.65 | 3.15 | 2.85 | 3.75 | 3.15 | 2.49 | 2.46 | 2.2 | 2.3 | 1.94 |
| 25.. | 2.45 | 2.6 | 2.8 | 2.85 | 2.65 | 3.15 | 4.0 | 2.36 | 5.5 | 2.23 | 2.14 | 1.92 |
| 26.. | 2.4 | 2.6 | 2.95 | 2.8 | 2.45 | 3.2 | 4.1 | 2.26 | 3.9 | 2.15 | 2.06 | 1.88 |
| 27.. | 2.45 | 2.6 | 2.85 | 2.7 | 2.4 | 3.15 | 3.7 | 2.18 | 3.5 | 2.14 | 2.0 | 1.88 |
| 28.. | 2.4 | 2.6 | 3.55 | 2.8 | 2.4 | 4.15 | 3.3 | 2.18 | 2.6 | 2.12 | 2.12 | 1.82 |
| 29.. | 2.35 | 2.6 | 5.15 | 3.25 | 2.55 | 3.65 | 3.1 | 2.34 | 2.52 | 2.05 | 2.12 | 3.8 |
| 30.. | 2.2 | 2.5 | 4.4 | 4.5 | ..... | 3.3 | 2.88 | 2.28 | 2.36 | 1.92 | 2.04 | 3.3 |
| 31.. | 2.3 | ..... | 3.55 | 4.15 | ..... | 3.05 | ..... | 2.42 | ..... | 1.92 | 2.0 | ..... |

The following data concerning the Blackwater River gaging station records for the year 1917 are taken from Water-Supply Paper 453, page 32:

"**Gage.**—Chain gage attached to upstream side of bridge; read by French Shaffer.

"**Extremes of stage.**—Maximum stage recorded during year. 8.37 feet at 7 a. m. March 12; minimum stage, 1.49 feet at 5 p. m. October 15.

"1911-1917: Extremes of stage are those recorded above.

"Accuracy.—........Discharge data subsequent to 1914 withheld for additional information. Gage read twice daily to tenths to April 1, then to hundreths. Gage readings probably affected by ice January 17 to February 20. Records good."

"The following discharge measurement was made by Peterson and Hopkins:

"September 24: Gage height, 1.64 feet, discharge, 9.1 second-feet."

## Daily Gage Height, in feet, of Blackwater River at Hendricks. W. Va., for the Year ending September 30, 1917.

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 2.75 | 1.86 | 2.37 | 3.10 | 3.04 | 3.08 | 2.40 | 2.52 | 3.48 | 2.14 | 1.94 | 2.12 |
| 2.. | 2.54 | 1.82 | 2.33 | 3.37 | 2.54 | 2.90 | 2.56 | 2.48 | 2.74 | 2.07 | 1.90 | 2.06 |
| 3.. | 2.21 | 1.88 | 2.20 | 3.64 | 3.52 | 2.72 | 2.49 | 2.46 | 2.44 | 1.98 | 1.89 | 2.10 |
| 4.. | 2.09 | 1.92 | 2.15 | 3.57 | 5.85 | 3.25 | 2.48 | 2.46 | 2.36 | 1.93 | 1.88 | 2.14 |
| 5.. | 1.97 | 1.87 | 2.56 | 3.80 | 6.43 | 3.26 | 2.88 | 2.46 | 2.32 | 1.90 | 1.86 | 2.10 |
| 6.. | 1.92 | 1.84 | 2.78 | 3.32 | 6.43 | 2.88 | 2.88 | 2.42 | 2.68 | 1.90 | 1.86 | 2.06 |
| 7.. | 1.60 | 1.82 | 2.50 | 3.04 | 6.43 | 2.71 | 2.74 | 2.40 | 2.58 | 2.16 | 1.85 | 2.22 |
| 8.. | 1.57 | 1.86 | 2.46 | 2.95 | 6.43 | 5.08 | 2.72 | 2.43 | 2.44 | 2.24 | 1.86 | 2.50 |
| 9.. | 1.66 | 1.92 | 2.44 | 2.84 | 6.43 | 4.77 | 2.62 | 2.44 | 2.46 | 2.06 | 2.42 | 2.38 |
| 10.. | 2.20 | 1.94 | 2.40 | 2.74 | 6.43 | 3.00 | 2.52 | 2.42 | 2.50 | 2.00 | 2.18 | 2.13 |
| 11.. | 1.63 | 1.92 | 2.38 | 2.49 | 6.43 | 4.80 | 3.00 | 2.40 | 2.54 | 1.97 | 1.97 | 2.00 |
| 12.. | 1.84 | 1.95 | 2.36 | 2.46 | 6.12 | 7.69 | 3.49 | 2.36 | 2.48 | 1.96 | 1.90 | 1.87 |
| 13.. | 1.66 | 2.27 | 2.34 | 3.04 | 6.12 | 5.61 | 3.06 | 2.34 | 2.46 | 1.97 | 1.84 | 1.82 |
| 14.. | 1.58 | 2.10 | 2.38 | 2.90 | 6.11 | 4.88 | 2.80 | 2.32 | 2.42 | 2.01 | 1.86 | 1.82 |
| 15.. | 1.52 | 2.00 | 2.41 | 2.76 | 5.94 | 4.32 | 2.70 | 2.29 | 2.30 | 2.08 | 1.92 | 1.79 |
| 16.. | 3.46 | 1.96 | 2.42 | 2.56 | 5.80 | 3.72 | 2.69 | 2.26 | 2.26 | 2.17 | 1.88 | 1.92 |
| 17.. | 4.34 | 2.00 | 2.44 | 2.46 | 5.73 | 3.70 | 2.65 | 2.24 | 2.24 | 2.26 | 1.82 | 1.90 |
| 18.. | 3.14 | 1.90 | 2.40 | 2.39 | 5.72 | 3.58 | 2.65 | 2.23 | 2.12 | 2.24 | 1.79 | 1.90 |
| 19.. | 3.84 | 1.88 | 2.58 | 2.29 | 5.39 | 3.36 | 2.60 | 2.22 | 2.09 | 2.20 | 1.78 | 1.86 |
| 20.. | 3.60 | 1.74 | 2.46 | 2.26 | 3.38 | 3.23 | 2.59 | 2.22 | 2.06 | 2.15 | 1.76 | 1.82 |
| 21.. | 3.27 | 1.72 | 2.86 | 4.20 | 3.05 | 3.62 | 2.54 | 2.22 | 2.04 | 2.12 | 1.74 | 1.80 |
| 22.. | 2.80 | 1.70 | 2.55 | 6.74 | 2.70 | 3.60 | 2.52 | 2.20 | 2.02 | 2.16 | 1.74 | 1.78 |
| 23.. | 2.60 | 1.88 | 2.42 | 4.23 | 3.01 | 3.60 | 2.46 | 2.34 | 2.02 | 2.18 | 1.76 | 1.78 |
| 24.. | 2.52 | 2.26 | 2.38 | 3.48 | 4.92 | 3.76 | 2.39 | 2.26 | 1.99 | 2.16 | 1.76 | 1.63 |
| 25.. | 2.42 | 2.42 | 2.36 | 2.88 | 3.38 | 3.36 | 2.54 | 2.16 | 1.98 | 2.18 | 1.74 | 1.68 |
| 26.. | 2.31 | 2.37 | 2.39 | 2.66 | 2.84 | 2.95 | 2.60 | 2.08 | 1.96 | 2.22 | 1.76 | 1.68 |
| 27.. | 2.29 | 2.58 | 3.39 | 2.48 | 3.76 | 2.86 | 2.37 | 3.36 | 1.96 | 2.18 | 1.79 | 1.68 |
| 28.. | 2.16 | 2.78 | 4.12 | 2.60 | 3.66 | 2.78 | 2.78 | 4.38 | 2.16 | 2.16 | 1.78 | 1.77 |
| 29.. | 2.11 | 2.69 | 3.68 | 3.57 | ..... | 2.67 | 2.85 | 4.67 | 2.30 | 2.15 | 1.74 | 1.78 |
| 30.. | 2.06 | 2.46 | 3.47 | 3.38 | ..... | 2.54 | 2.62 | 3.66 | 2.22 | 2.11 | 1.84 | 1.75 |
| 31.. | 1.97 | ..... | 3.29 | 3.00 | ..... | 2.50 | ..... | 3.38 | ..... | 2.02 | 2.20 | ..... |

## Discharge Measurements of Blackwater River at Hendricks, W. Va., 1918-1920.

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| 1918. | | Feet. | Sec.-ft. |
| Apr. 30... | B. L. Hopkins...................... | 2.35 | 202 |
| May 12... | B. L. Hopkins...................... | 2.28 | 172 |
| May 13... | B. L. Hopkins...................... | 2.26 | 163 |
| 1920. | | | |
| Nov. 16... | Bigwood and Lamoureux........... | 2.02 | 76.6 |

**Daily Gage Height, in feet, of Blackwater River at Hendricks, W. Va., for the Year ending September 30, 1918.**

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.. | 1.71 | 2.74 | 2.65 | 2.46 | 2.26 | 3.42 | 2.12 | 2.34 | 2.18 | 2.22 | 1.94 | 2.18 |
| 2.. | 1.68 | 2.38 | 2.50 | 2.46 | 2.21 | 3.34 | 2.12 | 2.34 | 2.10 | 2.08 | 1.87 | 1.95 |
| 3.. | 1.66 | 2.28 | 2.50 | 2.46 | 2.18 | 3.24 | 2.32 | 2.30 | 2.04 | 2.00 | 1.80 | 1.86 |
| 4.. | 1.66 | 2.20 | 2.46 | 2.46 | 2.18 | 3.26 | 2.62 | 2.24 | 2.00 | 1.90 | 1.78 | 1.84 |
| 5.. | 1.77 | 2.19 | 2.26 | 2.46 | 2.16 | 3.54 | 2.40 | 2.14 | 2.00 | 1.89 | 1.76 | 1.84 |
| 6.. | 1.80 | 2.18 | 2.21 | 2.62 | 2.25 | 3.55 | 2.20 | 2.14 | 2.04 | 2.21 | 1.72 | 1.84 |
| 7.. | 1.78 | 2.18 | 2.17 | 2.70 | 4.14 | 3.42 | 2.18 | 2.16 | 3.41 | 2.05 | 1.83 | 1.82 |
| 8.. | 1.79 | 2.15 | 2.16 | 2.67 | 3.76 | 3.41 | 2.36 | 3.11 | 2.72 | 1.95 | 2.04 | 1.80 |
| 9.. | 1.77 | 2.12 | 2.26 | 2.64 | 3.17 | 2.88 | 3.59 | 2.72 | 2.17 | 1.94 | 2.02 | 1.77 |
| 10.. | 1.75 | 2.12 | 2.26 | 2.64 | 3.66 | 3.60 | 2.83 | 2.40 | 2.12 | 1.90 | 1.86 | 1.75 |
| 11.. | 1.74 | 2.10 | 2.26 | 2.76 | 3.04 | 2.96 | 2.76 | 2.36 | 2.10 | 1.85 | 2.78 | 1.73 |
| 12.. | 1.80 | 2.08 | 2.26 | 3.32 | 3.22 | 3.16 | 2.62 | 2.28 | 2.02 | 1.84 | 2.42 | 1.76 |
| 13.. | 1.78 | 2.10 | 2.26 | 3.34 | 3.24 | 5.56 | 2.70 | 2.36 | 2.02 | 1.88 | 2.19 | 1.78 |
| 14.. | 1.74 | 2.12 | 2.14 | 3.14 | 3.18 | 5.37 | 3.00 | 3.12 | 1.99 | 1.94 | 2.31 | 1.76 |
| 15.. | 1.74 | 2.09 | 2.14 | 3.76 | 3.26 | 4.80 | 3.76 | 2.58 | 1.95 | 1.92 | 2.20 | 1.75 |
| 16.. | 1.72 | 2.07 | 2.14 | 3.81 | 3.10 | 3.96 | 4.16 | 2.38 | 1.94 | 1.85 | 2.02 | 1.72 |
| 17.. | 1.70 | 2.07 | 2.11 | 3.81 | 3.20 | 3.01 | 4.25 | 2.31 | 1.99 | 1.88 | 1.96 | 2.50 |
| 18.. | 1.68 | 2.04 | 2.11 | 3.47 | 3.44 | 2.82 | 4.02 | 2.22 | 2.58 | 1.88 | 1.92 | 3.85 |
| 19.. | 2.05 | 2.03 | 2.11 | 3.47 | 3.97 | 2.62 | 3.22 | 2.20 | 2.14 | 1.92 | 1.88 | 2.95 |
| 20.. | 2.28 | 2.00 | 2.11 | 3.47 | 6.04 | 2.50 | 2.92 | 2.34 | 2.05 | 1.90 | 1.90 | 2.52 |
| 21.. | 2.00 | 2.00 | 2.11 | 3.02 | 4.04 | 2.78 | 3.75 | 2.55 | 2.00 | 1.85 | 1.87 | 2.66 |
| 22.. | 1.98 | 2.02 | 2.11 | 3.02 | 3.84 | 2.90 | 3.55 | 2.32 | 2.27 | 1.80 | 1.81 | 2.30 |
| 23.. | 2.02 | 2.06 | 2.28 | 3.02 | 3.70 | 2.62 | 2.98 | 2.34 | 2.36 | 1.80 | 1.74 | 2.10 |
| 24.. | 2.20 | 2.14 | 2.44 | 3.02 | 3.75 | 2.49 | 2.66 | 2.26 | 2.12 | 1.88 | 1.95 | 2.01 |
| 25.. | 2.12 | 2.10 | 2.60 | 3.01 | 4.08 | 2.37 | 2.79 | 2.97 | 2.04 | 2.06 | 1.79 | 1.98 |
| 26.. | 2.02 | 2.08 | 2.70 | 3.35 | 5.66 | 2.32 | 2.64 | 3.02 | 2.16 | 1.90 | 1.77 | 1.97 |
| 27.. | 2.26 | 2.08 | 2.62 | 4.45 | 3.62 | 2.22 | 2.52 | 2.56 | 2.12 | 1.84 | 1.80 | 1.89 |
| 28.. | 2.19 | 2.16 | 2.65 | 4.12 | 3.31 | 2.20 | 2.32 | 2.48 | 2.04 | 1.78 | 1.77 | 1.80 |
| 29.. | 2.64 | 2.60 | 2.60 | 3.65 | ..... | 2.18 | 2.34 | 2.33 | 2.04 | 1.76 | 1.62 | 1.91 |
| 30.. | 3.73 | 2.70 | 2.47 | 2.89 | ..... | 2.18 | 2.31 | 2.24 | 2.17 | 1.78 | 1.77 | 1.56 |
| 31.. | 2.99 | ..... | 2.46 | 2.44 | ..... | 2.12 | ..... | 2.18 | ..... | 1.78 | 1.88 | ..... |

"NOTE.—Stage-discharge relation probably affected by ice during greater part of December and January."

**North Fork of Blackwater River.**—North Fork of Blackwater River rises at Fairfax Summit, at an elevation of 3,050 feet, flows southwestward, and empties into the Blackwater 1.1 miles south of Douglas, at an elevation of 2,400 feet, its total length being 7.4 miles and its total fall 650 feet. The area of its drainage basin is 18.24 square miles. Its principal tributaries are Long, Middle, Snyder, Sand, and Glade Runs. The main valley of this fork of the Blackwater is thickly settled with a large mining population, most of the timber having been removed, leaving the land mostly barren, but on several of the tributaries mentioned there are still large areas of cut-over woodland. From Fairfax Summit to Douglas the course of the stream is fairly placid, but below Douglas it becomes a raging torrent with numerous low cataracts, its bed being littered with huge boulders and being difficult for human passage.

**Pendleton Creek.**—Pendleton Creek rises in Tucker County 1.8 miles southeast of Fairfax Summit, at an elevation of 3,250 feet, flows southwestward and empties into the Blackwater 1 mile above the mouth of North Fork, at an elevation of 2,620 feet, its total length being 5.5 miles and its total fall 630 feet. The area of its drainage basin is 5.96 square miles. Its course throughout is fairly placid until it reaches a point one-half mile above its mouth, where it plunges abruptly downward into the gorge of the Blackwater. Its headwaters are still covered with cut-over woodland but along its lower course the land is mostly barren, the timber having been entirely removed.

**Beaver Creek.**—Beaver Creek rises between Dobbin Ridge and Cabin Mountain 4 miles eastward from Gatzmer, at an elevation of 3,470 feet, flows generally southwestward and empties into the Blackwater River at Davis, at an elevation of 3,070 feet, its total length being 12 miles and its total fall 400 feet. The area of its drainage basin is 23.26 square miles. Except along the first mile, next to Davis, its watershed is almost totally uninhabited, lumber and mining operations on its upper waters having ceased some years ago. Its principal tributaries are Lost, Chaffey, and Hawkins Runs, and certain other unnamed branches above Gatzmer. Except near Davis its entire basin is covered with cut-over woodland or barren wastes.

**Yellow Creek.**—Yellow Creek rises on the western slope of Brown Mountain, 1.5 miles southwest of Gatzmer, at an elevation of 3,360 feet, flows southwestward, and empties into the Blackwater 2.3 miles above Davis, at an elevation of 3,110 feet, its total length being 2.5 miles and its total fall 250 feet. The area of its drainage basin is 2.52 square miles. It is entirely uninhabited, its basin being covered with cut-over woodland or barrens.

**Little Blackwater River.**—Little Blackwater River rises between Brown and Cabin Mountains 1.5 miles southeast of Gatzmer, at an elevation of 3,300 feet, flows southward and southwestward, and empties into Blackwater River 4 miles east of Davis, at an elevation of 3,125 feet, its total length being 5.2 miles and its total fall 175 feet. The area of its drainage basin is 16.26 square miles. Its broad valley, within the mountain walls on either side, comprises the northern extension of the Canaan Valley prevously described on pages 63-4. Its watershed is partly barren, partly cut-over woodland, and partly glady land on which virgin spruce and hemlock timber still stands. Its course is very placid, there being numerous short meanders, developed during the time of the supposed Tertiary Peneplain or at some more recent period. Its principal tributaries are Glade Run with a drainage basin of 6.32 square miles, and certain other unnamed branches.

**North Branch of Blackwater River.**—North Branch of Blackwater River rises against the eastern slope of Canaan Mountain just north of Cooper Knob, at an elevation of 3,350 feet, flows eastward and thence northward, and empties into the Blackwater 2.4 miles northeast of Cortland, at an elevation of 3,140 feet, its total length being 5.2 miles and its total fall 210 feet. The area of its drainage basin is 8.65 square miles. Except at its extreme head it is a very sluggish stream, with numerous short meanders, developed during the time of the supposed Tertiary Peneplain, or possibly at some later period. A considerable portion of its broad valley is cleared and devoted to agriculture and grazing, there being glady land along its lower course and cut-over woodland or barrens along the rim of Canaan Mountain. Its broad basin is a portion of the Canaan Valley already described.

### North Branch of Potomac River.

The North Branch of the Potomac River rises at the Fairfax Stone at the point where Tucker, Preston, and Grant Counties corner with Garrett County, Maryland, at an elevation of 3,180 feet, flows first westward and thence northward through Tucker County for about one mile, and then veers northeastward through Preston County and into Garrett, and soon reaching the line between that county and Grant, continues in the same general direction for many miles. A further description of its drainage basin is not pertinent to this Report.

## TOPOGRAPHIC FEATURES.

In its general features the topography of Tucker County differs greatly from that of the central and western counties of the State. In the latter counties the predominant feature is that of an ancient plateau, or peneplain, highly dissected by the major drainage basins and their numerous lateral branches, the influence of geologic structure and stratigraphy being secondary. In Tucker, however, the reflection of violent structural disturbances, as modified by the nature of the surface rocks, is very pronounced. As a rule the hard rocks of the Allegheny and Pottsville Series form the more prominent mountain ridges, the softer sediments of the Mississippian and Devonian usually forming valleys or comparatively low hills or mountains. Inasmuch as the latter rocks come to the surface only in regions of uplift, anticlines are more common in the valleys and synclines more often occur in the high mountain plateaus. Extensive mountain scarps, formed by the basal members of the Pottsville, are a conspicuous feature, the eastern rim of Laurel Ridge, the western front of Backbone and McGowan Mountains, the eastern flank of Canaan and Brown Mountains and the western front of Cabin Mountain being prominent instances. Between the broad features mentioned above, the profiles of the local slopes reflect closely the outcropping rocks, those formed by the sandy sediments of the Conemaugh and Allegheny Series being usually gently rounded, or concave outward, those formed by the Pottsville being precipitous or sharply angular, and those of the soft Mauch Chunk Shales concave inward toward the mountain, due to the influence of the Pottsville above, which does not erode so rapidly. The Greenbrier Limestone tends to form wide benches, upheld by the hard rocks of the Pocono Series below, which often form precipitous bluffs. The Catskill Series of the Devonian almost invariably forms rounded slopes which are concave outward, but the Chemung below it presents sharply angular and clear-cut slopes, the soft shale members being preserved in place by the extremely hard sandstone lentils which occur at frequent intervals and govern largely the rate of erosion. The ridges formed by the latter group are usually very narrow at their summits, and the isolated hills, conical or pyramidal in shape, in sharp contrast to the broad mountain scarps formed by the Pottsville. Careful attention to these various topographic forms proved to be of great assistance in mapping the stratigraphy of the county.

The following remarks and deductions concerning certain peculiar topographic forms along Cheat River between Parsons and the Tucker-Preston County Line, have been prepared by Dr. Wm. Armstrong Price:

"The significance of these meanders is realized only in the light of the past geologic history of the County. The broad, elevated river terrace, the remnants of which now stand at an elevation of 1,850 to 1,900 feet above sea-level, can be clearly identified by the river clays and gravels found on upland flats at this level from the foot of Fork Mountain between the forks of Cheat in the town of Parsons to the southeastward prolongation of the Miller Hill, into the meander of the river just above the mouth of Tobes Run on the line between Licking and St. George Districts. Below this point the river flows across a low point in the axis of the Limestone Mountain Syncline. Here the valley is narrow, V-shaped, and its walls are steep and have a uniform slope unbroken by elevated flats, except a narrow flat which follows the outcrop of the Greenbrier Limestone.

"In this low portion of the synclinal axis the heavy and conglomeratic sandstone ledges of the Pocono Series are brought down to a low elevation. Ledges of the Pocono are found at an elevation of 1,750 feet in Limestone Mountain opposite the mouth of Licking Creek. The top of the Series lies at 1,985 feet here and it is probable that the base is about 30 feet below the lowest ledges seen, or at an elevation of 1,720 feet. It is evident, therefore, that the river was cutting through this sandstone series at the southwestern end of Limestone Mountain when the prominent terrace at 1,850-1,900 feet was formed. At this time the river must have flowed through a rough narrow gorge and there were rapids and falls in its course across the Pocono ledges. The present narrow valley is the consequence of this older condition.

"It was the resistance of the sandstone ledges to the downward cutting of the river which temporarily formed a base-level for the river and enabled it to devote its energies above this point to widening its valley and the previously formed meanders. This process was aided by the presence of considerable bodies of soft shales in the Chemung Series between St. George and Backbone Mountain. In them the river swung back and forth developing the large meanders of to-day. However, many courses of sandstone beds and sandy shales were also encountered by the river in excavating the terrace.

"It is also evident that, since the Pocono Series rises in all directions from this portion of the synclinal axis, it had influenced the work of the river for a long time before it cut down to the level of the 1,850-1,900-foot terrace. In fact the course of the river follows closely the axis of the Limestone Mountain Syncline from the mouth of Bull Run all the way to the termination of the syncline in Preston County 1 mile east of Rowlesburg[3]."

## RIVER TERRACES.

Evidence of former drainage levels higher than the present channel of Cheat is abundant, both along this river and on its major tributaries. The following table gives in condensed form the locations and other data concerning the terrace deposits of Cheat and its branches as observed by the writer:

[3]Hennen and Reger, Preston County Report, West Virginia Geological Survey, p. 71; 1914.

## Terrace Deposits Along Cheat River and Tributaries.

| Locality. | Evidence. | Tidal Elevation. Top. | Height of top above river. | Name of Terrace. |
|---|---|---|---|---|
| CHEAT RIVER OR NEAR-BY POINTS BELOW PARSONS: | | | | |
| Hannahsville, 0.7 mi. S. of | Boulders | 1600 | 125 | Second |
| Road, 0.7 mi. N. E. of Bull Run | Rounded point | 1665 | 165 | Second |
| Road, 0.5 mi. N. E. of Bull Run | Rounded gap | 1795 | 285 | Fourth |
| Minear Run, 0.9 mi. N. E. of St. George | Boulders | 1720 | 190 | Third |
| Horseshoe Run, 0.7 mi. N. E. of mouth | Gravel | 1635 | 85 | First |
| Snake Road, 1.4 mi. west of mouth of Horseshoe Run | Sand and gravel | 1745 | 205 | Third |
| Road, 0.9 mi. N. E. of Wolf Run | Boulders | 1865 | 305 | Fourth |
| Wolf Run, 0.8 mi. S. E. of mouth | Boulders | 1890 | 330 | Fifth |
| Moss Bridge, 1.1 mi. N. W. of | Sand and boulders | 1715 | 135 | Second |
| Moss Bridge, 0.5 mi. N. W. of | Sand and boulders | 1650 | 65 | First |
| Moss Bridge. just E. of | Sand and gravel | 1670 | 80 | First |
| Moss Bridge, 0.5 mi. E. of | Rounded gap with clay | 1865 | 275 | Fourth |
| Moss Bridge, 0.6 mi. S. of | Boulders | 1770 | 155 | Second |
| Alum Hill gap, 1 mi. N. of Parsons | Rounded gap | 1725 | 100 | Second |
| SHAVERS FORK ABOVE PARSONS: | | | | |
| Parsons, W. of R. R. Sta | Sand and gravel | 1710 | 70 | First |
| Parsons, W. of R. R. Sta | Sand and gravel | 1810 | 170 | Second |
| Parsons, W. of R. R. Sta | Sand and gravel | 1860 | 220 | Third |
| Parsons, W. of R. R. Sta | Smooth bench | 1980 | 340 | Fifth |
| Road, 0.5 mi. S. W. of Porterwood | Boulders | 1755 | 65 | First |
| Stonelick Run, near mouth | Clay and gravel | 1815 | 85 | First |
| Stonelick Run, 1.1 mi. S. of | Clay and boulders | 1815 | 65 | First |
| Pettit, 0.4 mi. N. E. of | Rounded gap | 1945 | 145 | Second |
| DRY FORK ABOVE PARSONS: | | | | |
| Parsons, just S. E. of | Boulders and clay | 1750 | 110 | First |
| Parsons, just S. E. of | Boulders and clay | 1830 | 190 | Second |
| Parsons, just S. E. of | Boulders and clay | 1860 | 220 | Third |
| Parsons, 0.4 mi. E. of | Boulders | 1820 | 190 | Second |
| Parsons 0.5 mi. N. E. of | Boulders | 1800 | 170 | Second |
| Roaring Run, 0.2 mi. W. of | Boulders | 1805 | 145 | Second |
| Hendricks, N. edge of | Boulders and clay | 1815 | 115 | Second |
| Middle Mt. road, 0.6 mi. N. E. of Jenningston | Boulders | 2130 | 120 | Second |
| Middle Mt. 0.6 mi. N. E. of Jenningston | Sand and gravel | 2295 | 270 | Fourth |
| Jenningston, 0.7 mi. S. E. of | Boulders | 2120 | 50 | First |
| Road, 0.7 mi. N. E. Dry Fork P. O. | Sand and gravel | 2370 | 195 | Third |
| Road, 0.5 mi. N. E. Dry Fork P. O. | Sand and gravel | 2265 | 90 | First |
| BLACKWATER RIVER ABOVE HENDRICKS: | | | | |
| Hendricks, 2.0 mi. N. E. of | Boulders | 1940 | 115 | Second |

PLATE IV.—Close-up of Blackwater River gorge (same as Plate III) showing Pottsville topography. Contact with Mauch Chunk is only a few feet above drainage at mouth of North Fork which appears in left foreground.

Flood-plain levels: **Cheat River**, at St. George, 13 feet; at Mill Run, 16 feet; **Shavers Fork**, at Parsons, 15 feet; **Dry Fork**, at Parsons, 15 feet; at Jenningston, 10 feet; **Blackwater River**, at Hendricks, 10 feet.

Summarized in compact form these observations reveal the five following terraces:

**Fifth Cheat River Terrace**, 330 to 340 feet above the river.
**Fourth Cheat River Terrace**, 275 to 300 feet above the river.
**Third Cheat River Terrace**, 200 to 225 feet above the river.
**Second Cheat River Terrace**, 125 to 170 feet above the river.
**First Cheat River Terrace**, 60 to 90 feet above the river.

The terrace deposits of Cheat River are evidently of Pleistocene age, dating back to the time when the waters of Cheat, Monongahela, Ohio, and other tributaries of the latter river, which previous to that time flowed northward into the Saint Lawrence drainage basin, were impounded by the great ice dam near the present location of the city of Beaver, Pennsylvania, the various accumulations representing different stages of the dam. A comparison of the Cheat River terraces with those of the Ohio River, as first described by Dr. White[4], is most interesting. According to Dr. White these terraces are five in number, occurring at the following levels above the Ohio:

### Ohio River Terraces.

| | |
|---|---|
| Fifth Terrace | 280 to 300 feet above the river. |
| Fourth Terrace | 200 to 220 feet above the river. |
| Third Terrace | 120 to 130 feet above the river. |
| Second Terrace | 60 to 80 feet above the river. |
| First Terrace | 30 to 40 feet above the river. |

In view of the fact that degradation since Pleistocene time has probably been more rapid on the waters of the upper Cheat Valley than along the more sluggish channel of the Monongahela and Ohio it seems reasonable to believe that the five terraces of Cheat River correspond to those of the Ohio, the interval of the First Cheat River Terrace above present drainage level being 30 to 50 feet greater than that of the

[4]I. C. White, Report Q, p. 10; Second Geological Survey of Pa.; 1878.

same terrace on the Ohio.

At various points where the Chemung shales outcrop along the Cheat River terraces, their color has been changed from the normal olive green to pink or red. The following deductions concerning these changes have been reached by Dr. Price:

"The weathering of green and brown, iron-bearing shales on elevated river terraces.

"At many points upon the outcrop of the Chemung shales in Tucker County and also in Randolph County in the Portage shales a light red color was encountered in beds which appeared to be normally olive green. In places a brown or yellowish color is found at the outcrop of these shales. A careful examination of these occurrences discloses that they are all on raised river terraces. At several points these light red or pink shales were found on remnants of the broad, prominent terrace lying 300 feet above Cheat River at Parsons and falling from an elevation of 2,160 feet at the mouth of Pheasant Run in Black Fork District to 1,850 to 1,900 feet from Parsons to Limestone Mountain. They were noted at 2,165 feet near the mouth of Pheasant Run; at 1,935 feet in the head of a small run on the mountain west of Parsons; at 1,845 feet in the head of Wolf Run; at 1,890 feet on top of the 'Slip Hill' between Wolf and Miller Runs, in St. George District; at 1,835 feet on the point between the mouth of Clover Run and Cheat River opposite St. George; and at various levels from 1,790 to 2,200 feet up Minear Run on the Location Road. This last figure is 300 feet higher than the river terrace noted but may be a higher terrace of the run corresponding to an upper terrace level of the river. On a prominent lower terrace they were noted at 1,690 feet in the Parsons-Davis road in the 'Holly Meadows', 2½ miles north of Parsons; at 1,650 and 1,710 feet along the Snake Road near St. George; and at 1,685 feet in the Location Road up Minear Run near its mouth. They were also noted in Randolph County a few feet above the present flood-plain of Leading Creek and of short tributaries of the Tygart River.

"Where small, steep rills have lately eroded these terraces a few feet below the terrace deposits, laying bare the fresh, unweathered shale beneath the terrace, it is seen that the light red shales change within a few feet to green. It is also seen that green shales in places alter to brownish and yellowish tones and in one case a mingling of the brown and red was noted. The red color of these shales is evidently due to the prolonged weathering which these shales have suffered upon the exposed elevated terraces. Here the weathered shales have been protected from erosion by the gentle grade of the terrace surfaces. It has recently been pointed out by G. E. Dorsey[5] that green shales owe their color to ferrous oxide. On weathering the ferrous oxide alters to an unstable yellow ferric hydrate. Two changes may then take place in the yellow weathered material: by union with silica a stable yellow, hydrated ferric silicate may be found, or, in warm, moist, temperate regions, the yellow ferric hydrate becomes dehydrated and alters to a stable, red ferric oxide. It is probable that in these light red and brown and red shales we are witnessing these changes. Whether the brown and yellow colors are due to the ferric hydrate or to the ferric silicate can not be told without a chemical analysis. Blocks of shale were examined in which the olive green color shades into greenish pink and finally to a light red. In some cases, at least, there appears to have been a minimum of yellow hydrate present and the dehydration must be proceeding almost simultaneously with the oxidation of the ferrous iron."

[5]G E. Dorsey, Manuscript "The Stratigraphy and Structure of the Triassic System of Maryland with the Discussion of the Origin and Climatic Significance of Red Beds." Dissertation for the Ph.D. Degree, Johns Hopkins University.

# PART II.

## Geology.

## CHAPTER III.

### STRUCTURE.

#### METHODS OF REPRESENTING STRUCTURE.

Two general methods of representing the structure or lay of the rocks are available to the stratigrapher. By the first method vertical cross-sections are used to portray the position of the beds, and by the second, structure contours are employed to show their dips and elevations. In Tucker County it has been necessary to use both methods. The western portion, where the Devonian Rocks mainly outcrop, has been severely folded by orogenic action, dips of 25 to 75 degrees being common, and vertical or overturned strata being sometimes found. In this region cross-sections, extending across the region of extreme folding, have been drawn by Dr. Price, supplemented along the borders of this area by structure contours on the Hendricks Sandstone of the Devonian.

In the eastern portion of the county, where the dip of the rock strata is comparatively gentle, structure contours only, based on the Upper Freeport (Davis) Coal, have been used to indicate their dips and elevations. Inasmuch as the various coal seams and other beds of importance lie approximately parallel, the contours on the coal can be used to determine the position of any other stratum. The Upper Freeport (Davis) Coal outcrops or lies buried under drainage throughout a considerable portion of Fairfax and Davis Districts, and the northeastern portion of Dry Fork District, along the North Potomac and Stony River Synclines. Farther southwest, in Canaan, Mozark, Green, and McGowan Mountains, the coal horizon is entirely above the topography and the same is true along the extreme outmost flanks of the two synclines named and along the Blackwater Anticline which divides them. In these regions observations on lower strata were necessarily employed, as will be subsequently explained in detail.

## DETAILED STRUCTURE.

### GENERAL FEATURES.

As mentioned above the western portion of Tucker is a region of extreme and sharp folding, there being numerous narrow folds, only a few of which extend entirely across the county. Many of the anticlines and synclines are discontinuous, their traceable lengths being only a few miles, interrupted by monoclines of considerable extent, followed in turn by other short isolated folds. Many of these short folds are lacking in symmetry, having limbs of unequal length and extreme variations in the pitch of the strata.

In the eastern portion of the county the folds are very broad and on the whole symmetrical, and their axes extend entirely across the area studied, the lithology of the strata being considered responsible for these broad structural features, as elaborated below by Dr. Price:

"One of the most striking characteristics of the folding is the difference between that observed in the Devonian shales and sandstones of the major anticlines and that in the heavy beds of the Pocono, Greenbrier, and Pottsville of the broad synclinal basins. These latter series form the so-called competent beds which are stronger and less yielding than the weaker shales of the Devonian. The result of the folding of the non-homogeneous mass has been the crinkling of the Devonian formations and the broad, gentle folding of the Carboniferous beds.

"The softer shales and sandstones of the Allegheny and Conemaugh Series above the heavy Pottsville sandstones have been protected from crumpling by the great series of competent strata below and were apparently never under sufficient load above to cause such crumpling during folding nor were there in the Monongahela Series and higher strata, which probably once covered this region, probably any heavy beds sufficiently massive to form competent members beneath which the weak Allegheny and Conemaugh shales might have been crumpled. In consequence of the action of the competent beds the folding in the anticlines in which Devonian shales appear at the surface is complex. For example, the axis of the Deer Park Anticline is somewhat sinuous and is accompanied on each side by parallel subordinate anticlines and synclines in groups of four or five or more. Some of these are minor folds imposed upon the sides of the Deer Park fold. Others are locally of the same magnitude as that fold. These subordinate folds are, however, discontinuous and are locally interrupted by abrupt widenings of the major fold.

"This group of folds may be considered as forming a single, broad uplift. The axis of this uplift appears to rise toward the southeast until it finally carries the Chemung Series above drainage and exposes the soft shales of the Portage Series in the valley of Leading Creek in New Interest District, Randolph County. The limbs of this broad uplift vary in steepness.

"The dip is more abrupt on the eastern limb from the Preston County Line southwestward to Parsons. Here the westward flexure of the main axis is accompanied by a reversal of the previous relations and the western limb, in Laurel Ridge in northwestern Randolph County, is quite steep while the eastern is broad and comparatively gentle in inclination as seen along Pheasant Run. The consequence of this reversal of the relations of the limbs combined with abrupt westward flexure is that the width of the Devonian outcrop is approximately the same throughout the extent of the Deer Park Anticline in Tucker County.

"It is probable that the Devonian strata beneath the competent series of Carboniferous strata in the broad basins are folded in a complex manner and that the Carboniferous strata where they originally passed above the broad complex anticlinal belts were folded in broad simple anticlines. This conception is indicated in the cross-sections on Map II."

## ANTICLINES AND SYNCLINES.

In the region of Devonian outcrops in western Tucker, seven anticlines worthy of being named have been traced for various distances, their titles in order, from northwest to southeast, as recorded on Map II, being the Texas, Etam, St George, Eglon, Drift Run, Deer Park, and Parsons. In the same region five synclines have been named, their titles in the same order being the Pifer Mountain, Hannahsville, St George, Leadmine, and Holly Meadows. Besides these more important anticlines and synclines there are numerous short arches and basins, mostly traceable for lengths of only two or three miles after which they flatten out against the limbs of more important structures. All of these have been indicated on Map II but no names have been given them.

In the region of the Pennsylvanian outcrops in eastern Tucker, the significant structural features are the North Potomac Syncline on the west, followed respectively by the Blackwater Anticline and Stony River Syncline, the latter being at the extreme eastern edge of the county.

A description of the various anticlines and synclines of the county follows below, starting at the western edge and passing to its eastern limit.

**Texas Anticline.**—The Texas Anticline, not previously described, originates in the extreme northwestern corner of Tucker County, one and one-half miles eastward from its common corner with Barbour and Preston, and extends generally slightly west of south, its course being somewhat sinuous, and its total length, as traced by Dr. Price, being six miles. Its axis crosses the heads of Right Fork of Bull Run and Brushy Fork of Teter Creek and, passing through Texas, reaches the head of a branch of Left Fork of Clover Run where it apparently dies out. The outcropping rocks along its axis are those of the Chemung Series of the Devonian, but on its western flank the Catskill and other younger measures appear in close succession along the steep structural slope. On its eastern flank only isolated deposits of the Catskill Series appear in ertain high summits.

**Pifer Mountain Syncline.**—The Pifer Mountain Syncline, not previously described, originates on Licking Creek, 1.6 miles east of the common corner of Tucker, Preston, and Barbour Counties, and extends southward across the heads of Right and Left Forks of Bull Run, 3.2 miles to the Pifer Church on Pifer Mountain, where it veers southwestward for one-half mile and dies out against the eastern limb of the Texas Anticline. It is an extremely shallow basin, symmetrical on either flank, the outcropping rocks being the Chemung Series of the Devonian.

**Etam Anticline.**—The Etam Anticline, so called provisionally by Hennen and the writer,[1] from a village of that name in southern Preston County, originates just north of Rowlesburg, Preston County, passes southward for one mile and thence southwestward, crossing Cheat River one-half below Macomber and the Northwestern Turnpike 1.2 miles west of the same village. At the turnpike it veers eastward to a course that is approximately South 22° West, passing just west of Etam and crossing the Preston-Tucker Line slightly more than one mile northeast of Hovatter. From the county line it continues the same general course for two and one-half miles, passing just east of Hovatter. At the ridge south of Licking Creek it turns nearly southward and so continues for almost three miles, crossing Right and Left Forks of Bull Run. At the Pifer Church, on Pifer Mountain, it turns southwestward again for one-half mile and apparently dies out in a maze of broken strata, beyond which no further extension was found.

The Etam Anticline appears to attain its most pronounced uplift in the vicinity of Etam, Preston County after which it descends to a comparatively low saddle just south of the Preston-Tucker Line, the elevation of the Hendricks Sandstone at this point being less than 2,500 feet. Farther south the arch

[1]Hennen and Reger, Preston County Report, W. Va. Geological Survey, p. 66; 1914.

rises again to an elongated dome, reaching its maximum at Right Fork of Bull Run where the Hendricks Sandstone is more than 2,700 feet above sea-level. The outcropping rocks along its axis in Tucker County belong entirely to the Chemung Series of the Devonian.

**Hannahsville Syncline.**—The Hannahsville Syncline, not previously named, although it has been described in part[2], originates in Preston County, one mile east of Rowlesburg, its course from that point being approximately South 17° East for 3½ miles, after which it veers to South 35° West and so continues for three miles to the Preston-Tucker County Line, passing between the villages of Erwin and Hardesty and twice crossing the meanders of Cheat River. Throughout most of its course in Preston County it is a shallow and scarcely perceptible basin but becomes a more pronounced depression near the Tucker County Line. In Tucker County its prevailing course is South 40° West, and its total traceable length 10 miles. It passes between Hannahsville and Limestone Mountain, crosses Cheat River near Macedonia Church, 0.8 mile above Bearwallow Run, crosses Bull Run just above its mouth, crosses Indian Fork of Clover Run, and dies out one mile farther southwest.

The portion of the basin in Tucker County is almost symmetrical above its axis, the dips on the western flank, near Hannahsville, being 800 feet to the mile, while on the opposite eastern limb they are 500 feet. In this region the contours on the Hendricks Sandstone indicate a deep, canoe-shaped depression, the elevation of the sandstone at the lowest point being slightly less than 1,300 feet. Southwest of Cheat River the rocks rise steadily along the axis for three miles and then flatten out toward the end of the syncline.

The outcropping surface rocks within the basin range from the Pottsville, which appears in Limestone Mountain, down through the Mauch Chunk, Greenbrier, Pocono, Catskill, and into the Chemung Series which is visible on Bull and Clover Runs.

The following remarks by Dr. Price, concerning the in-

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[2]Hennen and Reger, Preston County Report, W. Va. Geological Survey, pp. 71-72; 1914.

fluence of the Hannahsville Syncline on the topography, are of interest:

"This syncline has profoundly affected the topography of Tucker County. Its influence in temporarily checking the sinking of the valley of Cheat River, causing the cutting of the broad meanders between the Mountain and Parsons and the elevated stream terrace at 1,850-1,900 feet above sea has already been discussed. The presence of the pile of Carboniferous strata which forms Limestone Mountain is due to their having been carried below the level of drainage in a former cycle of erosion when peneplanation is generally believed to have removed thousands of feet of sediments from the Appalachian region. Its influence in determining the course of Cheat River from the southern end of Limestone Mountain to and for two miles beyond Erwin has been previously discussed (page 78)."

**St. George Anticline.**—The St. George Anticline, not previously described or named, is a minor fold, five miles long, starting at St. George, on Cheat River, and extending approximately South 50° West, crossing Clover Run, Right Fork of Clover, and dying out on Left Fork of Clover near the Harper School, beyond which it could not be traced. The outcropping surface rocks belong entirely to the Chemung Series of the Devonian.

**St. George Syncline.**—The St. George Syncline, not previously described or named, is a minor basin, approximately parallel to the St. George Anticline. It starts at St. George, less than one-fourth mile east of the anticline, and extends southwestward for three miles to Indian Fork of Left Fork of Clover Run, at which point its axis is one-half mile east of the anticline. It crosses both main Clover Run and Right Fork of the same stream. The outcropping rocks are entirely those of the Chemung Series.

**Eglon Anticline.**—The Eglon Anticline, not previously named, although it has been described in part[3], originates in Preston County, one-half mile west of the village of Eglon, and extends approximately South 40° West, crossing Maple,

[3]Henner and Reger, Preston County Report, W. Va. Geological Survey, p. 66; 1914.

Horseshoe, and Twelvemile Runs, just south of which it enters Tucker County, and continues across Thunderstruck Run and dies out against a general northwestward slope one-half mile beyond that stream. Its total length is approximately 7 miles, of which 5½ miles are in Preston County. The outcropping surface rocks are almost entirely those of the Chemung Series, the Catskill being present only at the extreme northern end, near Eglon. Between the southwestern end of the Eglon Anticline and Cheat River, a distance of 7 miles, the structure of the rocks is mainly monoclinal, with northwestward dips. Near the river, however, certain minor flexures again appear but it is not apparent that they represent an extension of the anticline. East of the anticline, for a distance of about one mile, two short, disconnected synclines and one short anticline appear, indicating an extremely broken structure.

**Drift Run Anticline.**—The Drift Run Anticline, not previously described or named, originates one mile northwest of Shafer and extends approximately South 40° West for 6 miles, crossing Thunderstruck Run, Lick Drain, and Hvee Run, and passing diagonally across Drift Run, extends one mile beyond Mike Run. Beyond this point for a distance of two miles the dip is apparently monoclinal for two miles to Cheat River just below the Horseshoe Bend, where an anticlinal structure is again apparent which extends 3½ miles farther, crossing the Snake Road and a short branch of Clover Run, just beyond which the arch disappears. It would appear that this latter short anticline could properly be interpreted as an extension of the Drift Run Anticline, since the alignment and direction are the same, with only a slight interruption of the arch.

The outcropping rocks along the anticline are entirely those of the Chemung Series. Throughout most of its extent the fold is marked by several short subsidiary anticlines and synclines, varying from one to two miles in length, that occur on both flanks, indicating an extremely broken structure.

**Leadmine Syncline.**—The Leadmine Syncline, not previously named, although it has been described in part[4], origi-

[4]Hennen and Reger, Preston County Report, W. Va. Geological Survey, p. 72; 1914.

nates near Horseshoe Run Post-office, Preston County, and extends South 37° West to the Preston-Tucker Line. In Tucker it is traceable for twelve miles, having the general direction of South 45° West, with minor deviations. It crosses Twelvemile and Thunderstruck Runs, passes 0.4 mile west of Leadmine village, crosses Lick Drain, Hyle, Drift, and Mike Runs, crosses the meanders of Cheat River at three points in the vicinity of the Horseshoe Bend, and finally dies out in the divide between Sugarcamp and Clover Runs, 2½ miles northwest of Parsons. It is an extremely narrow basin, the distance from its axis to that of the Drift Run Anticline on the west and the Deer Park Anticline on the east being little more than one-half mile at most points and much less at other localities. The surface geology is entirely that of the Chemung Series.

**Deer Park Anticline.**—Deer Park Anticline of Martin[5], which extends from Maryland across the extreme southwest corner of Preston County, enters Tucker at the divide betwen Horseshoe and Wolf Runs, one mile northwest of Shafer and extends entirely across the county for a distance of 16 miles. For the first twelve miles of its course in the county, its general direction is South 46° West, with minor deviations. It crosses Wolf and Leadmine Runs, Lick Drain and Hyle Run, its course for eight miles being closely parallel to Horseshoe Run which it crosses four times. It also passes directly through the village of Leadmine. In the vicinity of the Horseshoe Bend it crosses the meanders of Cheat River at three points. Two and one-half miles beyond Cheat River it reaches the divide between Clover and Haddix Runs, and veering northward to a course slightly south of west, follows this divide closely to the Tucker-Randolph County Line.

The Deer Park Anticline is the principal arch of the Devonian strata in western Tucker. It is not only the highest uplift but also passes across the county and is known to extend for many miles southwestward in Randolph County, as well as northeastward across Preston County, and Garrett County, Maryland, into Pennsylvania. The numerous other

[5]G. C. Martin, Accident-Grantsville Folio, No. 160, United States Geological Survey; 1908.

short anticlines that occur on both flanks in Tucker County appear to be only subsidiary folds, developed by crumpling of the weak shaly strata during the formation of the major anticline. The surface geology along its axis is entirely that of the Chemung Series, the Catskill and higher series being present on either side at distances varying from 1½ to 6 miles.

**Holly Meadows Syncline.**—The Holly Meadows Syncline, not previously described or named, originates 1.3 miles southeast of the mouth of Horseshoe Run, and extends South 45° West, with minor deviations, a distance of slightly more than 7 miles. It crosses Dry Run, and crosses Cheat River at three points, two of which are at the eastern end of the Horseshoe Bend and one near the southern end of the Holly Meadows. Beyond Cheat River it crosses the headwaters of Sycamore Run and crosses Haddix Run 0.7 mile northwest of Moore, and dies out against a long southeastward structural slope three-fourths mile west of Moore. It is a narrow basin, its two flanks being characterized by several short, minor wrinkles that occur between its axis and those of the Deer Park and Parsons Anticlines. The surface geology is entirely that of the Chemung Series.

**Parsons Anticline.**—The Parsons Anticline, not previously described or named, originates 1.5 miles northeast of the mouth of Horseshoe Run, and extends South 38° West with minor deviations, for 7 miles. At its origin its axis is only one-fourth mile from that of the Holly Meadows Syncline, but in passing southwestward there is an increasing divergence, until the distance between them at the farther extremities is more than one mile. It crosses Dry and Mill Runs, passes through the extreme eastern end of the Horseshoe Bend of Cheat River, crosses the same stream again at the southern extremity of the Holly Meadows, passes about one-half mile west of Parsons, crosses Sycamore, Hawk, and Haddix Runs, and dies out against the long southeastward structural slope at Jobs Run, one mile southwest of Porterwood. In the vicinity of Parsons and Porterwood its two flanks are characterized by several minor wrinkles that interrupt the slope, all of which are indicated on Map II. The surface geology is entirely that of the Chemung Series.

**North Potomac (Georges Creek) Syncline.**—The North Potomac Syncline of Darton and Taff[6], or Georges Creek Syncline of O'Harra[7], is the principal basin of the Carboniferous strata of eastern Tucker. The same syncline has been designated by various titles in Pennsylvania[8], but these earlier names, although entitled to precedence by strict interpretation of the rules of geologic nomenclature, appear to have fallen entirely into disuse and would be confusing if now revived. It is therefore thought best in the present volume to use only the names "North Potomac" and "Georges Creek," both of which are commonly applied to the basin, the former being the earlier and more preferable title.

This syncline, which can not be described in detail northeast of the county line, enters Tucker one-fourth mile southeast of its common corner with Preston and Grant Counties, and extends by a somewhat sinuous, but generally southwestward, course entirely across the county, its total length within the area of study being 16½ miles. For the first six miles it closely parallels the North Fork of Blackwater River, passing just west of William, 0.75 mile northwest of Thomas, just west of Douglas, and just west of the mouth of North Fork. One-fourth mile below this point it crosses Blackwater River and extends straight to the Dry Fork of Cheat River just above the mouth of Otter Creek. Continuing the same course it crosses Otter Creek one-fourth mile north of the Tucker-Randolph County Line, and crosses the county line one-eighth mile west of Otter Creek. In Randolph County it extends on to Shavers Fork of Cheat River a short distance east of Bowden Station and from thence closely follows the valley of the same stream to its headwaters in Pocahontas County.

The area included within the North Potomac Syncline is large. At the Tucker-Grant County Line its axis is distant

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[6]N. H. Darton and J. A. Taff, Piedmont Folio, No. 28, United States Geological Survey; 1896.

[7]C. C. O'Harra, Allegany County Report, Md. Geological Survey, pp. 150-152; 1900.

[8]The name "Buckstown" was applied to it by the First Geological Survey of Pennsylvania, but it was later (Report T2, Second Geological Survey, Pa.; 1882) termed the "Savage Mountain Synclinal" by John J. Stevenson. Still later (on map made to accompany Report HHH, Second Geological Survey, Pa.; 1888) it was styled the "Wellersburg Basin" by John Fulton.

five miles from that of the Deer Park Anticline on the northwest and eight miles from the Blackwater Anticline on the southeast. At the mouth of Otter Creek it is distant eight and six miles, respectively, from the same folds, but is only six miles from the Parsons Anticline, which in that region lies southeast of the Deer Park Anticline. Along the axis of the syncline there is a continual southwestward rise of the strata, the rate of which decreases steadily toward the Randolph County Line. Between the Tucker-Grant County Line and the forks of Blackwater River, the rate is approximately 125 feet per mile, but from the latter point to the Randolph Line it is only 20 feet per mile. Along the axis there is a zone of comparatively flat strata, varying from 1½ to 2 miles in width, beyond which, on either flank, the rise becomes more rapid toward the anticlines on the northwest and southeast. The basin is lacking in symmetry, as shown by Map II, the rise on the northwest, beyond the flat zone, being much more rapid with each succeeding contour, while on the southeast it has a more constant rate.

The surface geology along the axis is that of the Pennsylvanian and Mississippian Rocks. At the Grant County Line the elevation of the Upper Freeport (Davis) Coal is approximately 2,350 feet, at the forks of Blackwater 3,100 feet, and at the Randolph County Line its horizon slightly exceeds 3,300 feet. Between the Grant County Line and the forks of Blackwater the lower members of the Monongahela and the entire Conemaugh, Allegheny, and Pottsville outcrop in succession. At the forks of Blackwater the Mauch Chunk Red Shales are barely above drainage, but on Dry Fork River and Otter Creek the entire series, as well as a portion of the Greenbrier Limestone, is above water-level, the Pottsville and a portion of the Allegheny outcropping higher on the mountains. With the exception of that portion of the basin between Grant County and Douglas, where the surface slopes are fairly gentle, the topography consists of rough and precipitous mountainsides, capped by broad summits that are covered with sandstone talus. The large timber from this latter region has been entirely removed, leaving a desolate wilderness of most uninviting aspect.

**Blackwater Anticline.**—The Blackwater Anticline of Darton and Taff[9], occurs between the North Potomac and Stony River Synclines, its origin being in the forks of these two basins, near Steyer, Maryland, on the North Branch of Potomac River. From Steyer its course is slightly west of south, across Grant County, entering Tucker near the extreme northeastern corner, between Dobbin Ridge and Cabin Mountain. From the county line its course is approximately South 25° West for 16 miles to the southwestern end of the Canaan Valley, its axis lying closely parallel to Little Blackwater River, the meanders of which it crosses at two points, beyond which it lies just east of Blackwater River and finally crosses this stream near the mouth of Freeland Run and passes just east of Buena. Throughout this region its principal uplift is practically coincident with the Canaan Valley which embraces the flat lands along Little Blackwater and the upper portion of Blackwater Rivers. From the southwestern end of the Canaan Valley it veers more nearly westward in a rainbow curve and crosses Dry Fork of Cheat River at Scotts Siding where it enters Randolph County. In the latter county it turns toward the south again and, cutting diagonally across the valley of Laurel Fork of Dry Fork, passes about one mile east of Evenwood on Glady Fork of Dry Fork, beyond which its course has not been studied in detail by the writer.

Within Tucker County the area embraced by the Blackwater Anticline is large, its distance to the North Potomac Syncline on the northwest varying from 6 to 8 miles and to the Stony River Syncline on the southeast varying from 3 to 5 miles. From the Grant County Line southwestward there is a continual rise of the strata along the axis for ten miles, averaging 180 feet per mile, to the Davis-Dry Fork District Line, which is the center of an elongated dome, with closure of fully 500 feet. From the district line southwestward to Scotts Siding there is a continual dip along the axis, averaging about 50 feet per mile.

The surface geology along the anticline in Tucker ranges from the lower portion of the Conemaugh Series of the Pennsylvanian, down through the Allegheny and Pottsville of the same, and the Mauch Chunk, Greenbrier, and Pocono of the

[9]N. H. Darton and J. A. Taff, Piedmont Folio, No. 28, United States Geological Survey; 1896.

same, and the Mauch Chunk, Greenbrier and Pocono of the Mississippian, into the Catskill Series of the Devonian, which outcrops on Dry Fork in the vicinity of Scotts Siding. At the Grant County Line the elevation of the Upper Freeport (Davis) Coal is 3,200 feet; on the top of the dome at the Davis-Dry Fork District Line its horizon is more than 5,000 feet; and at Scotts Siding it is 4,500 feet. The topography along that part of the anticline embraced within the Blackwater drainage is that of a broad, marshy valley, from which a low ridge made by the Pocono Sandstones emerges beneath the great dome, flanked on either limb by lofty mountain escarpments formed by the hard rocks of the Pennsylvanian.

The Blackwater Anticline has been described in a recent publication by Ashley[10], under the name of the "Canaan Valley Anticline," but as the work of Darton and Taff antedates that of Ashley by 24 years the title adopted by them deserves precedence.

**Stony River Syncline.**—The Stony River Syncline of Darton and Taff[11] crosses the extreme eastern edge of Tucker County. This basin branches from the North Potomac Syncline near Chaffee, Mineral County, and passing across Mineral and Grant Counties along the valleys of Abrams Creek and Stony River, enters Tucker midway between Cabin Mountain and the Alleghany Front. From this point its general course is slightly west of south, there being local deviations. It crosses the extreme head of Red Creek, Left Fork of the same, and turning southeastward, again crosses Red Creek and enters Randolph County 2 miles east of Laneville. Crossing the extreme eastward tip of Randolph it extends into Pendleton County coincident with the valley of Roaring Creek, near the mouth of which it crosses Seneca Creek. Beyond this point its course has not yet been traced.

The structure along this syncline in Tucker County is fairly symmetrical about its axis, the rise to the northwest and southeast being much the same. The surface geology ranges from the lower portion of the Conemaugh down

[10]Geo. H. Ashley, Bull. 711-F, United States Geological Survey, p. 93; 1920.

[11]N. H. Darton and J. A. Taff, Piedmont Folio, No. 28, United States Geological Survey; 1896.

through the Allegheny, Pottsville, and Mauch Chunk, which outcrops in the valley of Red Creek in the vicinity of Laneville. There is a southwestward rise along the axis through the county, the elevation of the Upper Freeport (Davis) Coal at the Grant County Line being 3,450 feet and at the Randolph County Line 3,750 feet, making a rate of slightly more than 30 feet per mile. The topography is extremely rugged, both the mountain slopes and the valleys being mostly covered with sandstone talus. The large timber has been removed and the region is entirely uninhabited except in the valley of Red Creek at Laneville.

## STRUCTURE CONTOURS ON UPPER FREEPORT (DAVIS) COAL.

In the coal-bearing region of eastern Tucker the **Upper Freeport (Davis) Coal** has been used as the basis of the structure map. While it is true that this coal actually occurs in the the ground in a comparatively limited portion of the North Potomac and Stony River Basins, it is the most valuable, most persistent, and most easily identified seam of coal in the region. On Map II, which accompanies this Report, its elevation above sea-level has been indicated by **Red Contour Lines.** These contours extend from the eastern border of the county westward to Backbone and McGowan Mountains where the Coal Measures (Pennsylvanian) disappear above the summits on the northwestward rise of the rocks, and appear again only in the summit of Limestone Mountain and at the Barbour County Line.

In the North Potomac Basin the Upper Freeport (Davis) Coal apparently has not been prospected in the region south of Blackwater River although its horizon should be present in some of the high summits of Canaan and Green Mountains. In the Stony River Basin it is present in a limited portion of the region north of Laneville, having been opened at one point, and its horizon has been pierced by a few bore holes. Along the Blackwater Anticline its horizon is entirely above the topography. In these regions it was necessary, therefore, to use other key-rocks from the lower measures, their intervals from the coal having been carefully determined at certain available points. The most valuable stratigraphic horizons among these lower strata proved to be the Sewell (Sharon?) Coal and the top of the Greenbrier Limestone, neither of which could be easily mistaken.

The detailed work necessary to prepare the structure map included many hundreds of observations on the key-rocks and other known stratigraphic horizons. Elevations were obtained mainly by the use of the aneroid checked on the nearest government spirit-level determination as recorded on the topographic maps. In many cases it was possible to make hand-level measurements directly to the mines and prospects, thus reducing the possible error. Spirit-level determinations made by the Davis Coal & Coke Company and the Cumberland Coal Company on their various mines and borings were also placed at the disposal of the Survey, adding greatly to the accuracy of the work. Experience in other counties has proved that levels obtained by the aneroid and checked on the topographic base maps are seldom as much as 25 feet in error, being often within 5 or 10 feet of the truth, and it is believed that the structure map of Tucker County will generally come within these limits.

There is a considerable variation in interval between the various stratigraphic horizons at different points, due in part to local unconformity but mainly to thickening of the measures toward the south and southwest. In order that this fact might not interfere with the accuracy of the structure map, or destroy its purpose, numerous detailed stratigraphic cross-sections and special measurements of intervals from place to place were made. The principal results of these many observations are condensed in the three following tables, showing intervals above and below the Upper Freeport (Davis) Coal, the Sewell (Sharon?) Coal, and the top of the Greenbrier Limestone, respectively. These tables have been used in determining contours on the Upper Freeport (Davis) Coal in localities where direct observations could not be obtained. Their use in conjunction with the additional data presented in Chapter IV is recommended for those who prospect further for the coals or other economic strata. Several columns in the tables show vacant spaces either because the members named at the left belong above the tops of the ridges or because they lie below drainage and there are no present data to show the information called for. Figures in parentheses indicate that the member was not found in the locality called for at the top of the column, or its horizon was above the topography or below drainage, sufficient general information being available to approximate its interval fairly well by deduction. In order to find the approximate elevation of any coal its interval from the Upper Freeport (Davis) bed should first be obtained by using the tables or by referring to the local section measured for the nearest point. Having the structure contours as a guide the coal should then be easily found:

### Intervals Above and Below Upper Freeport (Davis) Coal—Tucker County.

| Formation. | Davis. | Douglas. | Fairfax. | Gatzmer | Laneville. | Thomas. |
|---|---|---|---|---|---|---|
| Redstone Coal | ...... | ...... | 870 | ...... | ...... | ...... |
| Pittsburgh Coal | ...... | ...... | 850 | ...... | ...... | ...... |
| Little Pittsburgh Coal | ...... | ...... | 835 | ...... | ...... | ...... |
| Little Clarksburg Coal | ...... | ...... | 775 | ...... | ...... | ...... |
| Lower Lonaconing Coal | ...... | ...... | ...... | ...... | ...... | ...... |
| Upper Hoffman Coal | ...... | ...... | ...... | ...... | ...... | ...... |
| Wellersburg Limestone | ...... | ...... | 545 | ...... | ...... | ...... |
| Elk Lick (Barton) Coal | ...... | ...... | 440 | ...... | ...... | ...... |
| Ames Limestone | ...... | 285 | 230 | ...... | ...... | 300 |
| Harlem Coal | ...... | 280 | 325 | ...... | ...... | 295 |
| Bakerstown (Thomas) Coal | 190 | 190 | 200 | 190 | 175 | 195 |
| Pine Creek Limestone | ...... | ...... | ...... | ...... | ...... | ...... |
| Brush Creek Limestone | 135 | 135 | 130 | 135 | 105 | 150 |
| Brush Creek Coal | 130 | 130 | 125 | 130 | 100 | 145 |
| Mahoning (Piedmont) Coal | 75 | 75 | 75 | 75 | 70 | 75 |
| UPPER FREEPORT (DAVIS) COAL | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower Freeport Coal | 45 | 45 | ...... | 45 | 25 | 45 |
| Upper Kittanning Coal | 80 | 80 | ...... | (80) | 95 | 80 |
| Middle Kittanning Coal | 90 | 90 | ...... | (90) | ...... | 90 |
| Lower Kittanning Coal | 105 | 105 | ...... | (105) | ...... | 105 |
| Clarion Coal | 130 | 130 | ...... | (130) | ...... | 130 |
| Homewood Sandstone (Top) | 140 | 140 | ...... | (140) | 105 | 140 |
| Upper Mercer Coal | 215 | 215 | ...... | ...... | 190 | ...... |
| Kanawha Black Flint Horizon | (225) | (225) | ...... | ...... | 230 | ...... |
| Lower Mercer (Stockton) Coal | (230) | (230) | ...... | ...... | 235 | ...... |
| Quakertown Black Shale | 350 | 350 | ...... | ...... | 310 | ...... |
| Quakertown (Winifrede?) Coal | 355 | 355 | ...... | ...... | 315 | ...... |
| Winifrede Limestone | (380) | (380) | ...... | ...... | ...... | ...... |
| Williamson Coal | 400 | (400) | ...... | ...... | ...... | ...... |
| Dingess Limestone | 420 | (420) | ...... | ...... | ...... | ...... |
| Gilbert Coal | (440) | (440) | ...... | ...... | ...... | ...... |
| Nuttall Sandstone (Top) | 450 | 450 | ...... | ...... | 325 | ...... |
| Hughes Ferry Coal | (530) | (530) | ...... | ...... | (400) | ...... |
| Castle Coal | (550) | (550) | ...... | ...... | (415) | ...... |
| Hartridge Shale | 570 | 570 | ...... | ...... | 465 | ...... |
| Sewell (Sharon?) Coal | 575 | 575 | ...... | ...... | 470 | ...... |
| Welch Coal | (600) | (600) | ...... | ...... | 510 | ...... |
| Beckley Coal | ...... | ...... | ...... | ...... | ...... | ...... |
| Fire Creek Coal | (630) | 630 | ...... | ...... | 580 | ...... |
| Pottsville Series (Base) | 660 | 660 | ...... | ...... | 600 | ...... |
| Princeton Sandstone (Top) | (700) | (700) | ...... | ...... | 750 | ...... |
| Greenbrier Limestone (Top) | (1150) | (1150) | ...... | ...... | 1400 | ...... |

## Intervals Above and Below Sewell (Sharon?) Coal—Tucker County.

| Formation | Buena. | Davis. | Douglas. | Flanagan Hill. | Hannahsville. | Hendricks. | Laneville. | Otter Creek. | Petitt. |
|---|---|---|---|---|---|---|---|---|---|
| Bakerstown (Thomas) Coal | ...... | 765 | 765 | ...... | ...... | ...... | (645) | ...... | ...... |
| Pine Creek Limestone | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| Brush Creek Limestone | ...... | 710 | 710 | ...... | ...... | ...... | 575 | ...... | ...... |
| Brush Creek Coal | ...... | 705 | 705 | ...... | ...... | ...... | 570 | ...... | ...... |
| Mahoning (Piedmont) Coal | ...... | 650 | 650 | ...... | ...... | ...... | 540 | ...... | ...... |
| Upper Freeport (Davis) Coal | ...... | 575 | 575 | ...... | ...... | (590) | 470 | (670) | ...... |
| Lower Freeport Coal | ...... | 530 | 530 | ...... | ...... | (545) | 445 | ...... | ...... |
| Upper Kittanning Coal | ...... | 495 | 495 | ...... | ...... | (510) | 380 | ...... | ...... |
| Middle Kittanning Coal | ...... | 485 | 485 | ...... | ...... | (500) | ...... | ...... | ...... |
| Lower Kittanning Coal | ...... | 470 | 470 | ...... | ...... | (495) | ...... | ...... | ...... |
| Clarion Coal | ...... | 445 | 445 | ...... | ...... | (470) | ...... | ...... | ...... |
| Homewood Sandstone (Top) | ...... | 435 | 435 | ...... | (395) | 460 | 365 | 535 | (535) |
| Upper Mercer Coal | ...... | 360 | 360 | ...... | (315) | 360 | 280 | 440 | (440) |
| Kanawha Black Flint Horizon | ...... | (350) | 350 | ...... | (305) | 345 | 240 | 405 | (405) |
| Lower Mercer (Stockton) Coal | ...... | (345) | 345 | ...... | (300) | 340 | 235 | 400 | 400 |
| Quakertown Black Shale | ...... | 225 | 225 | ...... | (205) | 250 | 160 | 270 | (270) |
| Quakertown (Winifrede?) Coal | ...... | 220 | 220 | ...... | (200) | 245 | 155 | 265 | (265) |
| Winifrede Limestone | ...... | 195 | (195) | ...... | ...... | 225 | ...... | 240 | (240) |
| Williamson Coal | ...... | 175 | (175) | ...... | ...... | 215 | ...... | 230 | (230) |
| Dingess Limestone | ...... | 155 | (155) | ...... | ...... | 200 | ...... | 210 | (225) |
| Gilbert Coal | ...... | (135) | (135) | ...... | ...... | 110 | ...... | 170 | 170 |
| Nuttall Sandstone (Top) | ...... | 125 | 125 | ...... | ...... | 90 | 145 | 150 | 150 |
| Hughes Ferry Coal | ...... | (45) | (45) | ...... | ...... | (50) | (70) | 55 | 55 |
| Castle Coal | ...... | (25) | (25) | ...... | ...... | (30) | (55) | 30 | 30 |
| Hartridge Shale | ...... | 5 | 5 | ...... | 5 | 5 | 5 | 5 | 5 |
| SEWELL (SHARON?) COAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Welch Coal | 30 | (25) | (25) | ...... | ...... | (25) | 40 | (25) | (25) |
| Beckley Coal | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| Fire Creek Coal | 100 | (55) | (55) | ...... | ...... | 65 | 110 | 110 | 90 |
| Pottsville Series (Base) | 110 | 85 | 85 | 150 | 55 | 70 | 130 | 120 | 100 |
| Princeton Sandstone (Top) | 225 | (125) | (125) | 200 | ...... | (120) | 280 | 160 | 150 |
| Hinton Limestone (Top) | 725 | ...... | ...... | 1050 | ...... | 550 | 875 | 675 | 500 |
| Greenbrier Limestone (Top) | 810 | (575) | (575) | 1150 | 360 | 600 | 960 | 750 | 600 |
| Pocono Series (Top) | (1160) | ...... | ...... | 1400 | 525 | 890 | 1400 | (1050) | 850 |
| Catskill Series (Top) | ...... | ...... | ...... | 1550 | 790 | 1000 | (1525) | (1160) | 1025 |
| Chemung Series (Top) | ...... | ...... | ...... | ...... | 1340 | 1600 | ...... | ...... | 1525 |
| Parkhead Series (Top) | ...... | ...... | ...... | ...... | ...... | (1700) | ...... | ...... | ...... |
| Portage Series (Top) | ...... | ...... | ...... | ...... | ...... | (4600) | ...... | ...... | ...... |

## Intervals Above and Below Greenbrier Limestone (Top) —Tucker County.

| Formation | Buena. | Davis. | Douglas. | Flanagan Hill. | Hambleton. | Hannahsville. | Hendricks. | Laneville. | Otter Creek. | Parsons. | Pettit. | Texas. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bakerstown (Thomas) Coal | ...... | (1340) | (1340) | | | | | | | | | |
| Pine Creek Limestone | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 1605 | ...... | ...... | ...... | ...... |
| Brush Creek Limestone | ...... | (1285) | (1285) | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| Brush Creek Coal | ...... | (1280) | (1280) | ...... | ...... | ...... | ...... | 1535 | ...... | ...... | ...... | ...... |
| Mahoning (Piedmont) Coal | ...... | (1225) | (1225) | ...... | ...... | ...... | ...... | 1530 | ...... | ...... | ...... | ...... |
| Upper Freeport (Davis) Coal | ...... | (1150) | (1150) | ...... | ...... | ...... | ...... | 1500 | ...... | ...... | ...... | ...... |
| Lower Freeport Coal | ...... | (1105) | (1105) | ...... | ...... | ...... | (1190) | 1430 | ...... | ...... | ...... | ...... |
| Upper Kittanning Coal | ...... | (1070) | (1070) | ...... | ...... | ...... | (1145) | 1405 | ...... | ...... | ...... | ...... |
| Middle Kittanning Coal | ...... | (1060) | (1060) | ...... | ...... | ...... | (1110) | 1340 | ...... | ...... | ...... | ...... |
| Lower Kittanning Coal | ...... | (1045) | (1045) | ...... | ...... | ...... | (1100) | ...... | ...... | ...... | ...... | ...... |
| Clarion Coal | ...... | (1020) | (1020) | ...... | ...... | ...... | (1095) | ...... | ...... | ...... | ...... | ...... |
| Homewood Sandstone (Top) | ...... | (1010) | (1010) | ...... | ...... | ...... | (1070) | ...... | ...... | ...... | ...... | ...... |
| Upper Mercer Coal | ...... | (935) | (935) | ...... | ...... | (755) | 1060 | 1325 | 1285 | 1150 | (1135) | ...... |
| Kanawha Black Flint Horizon | ...... | (925) | (925) | ...... | ...... | (675) | 960 | 1240 | 1190 | 1050 | (1040) | ...... |
| Lower Mercer (Stockton) Coal | ...... | (920) | (920) | ...... | ...... | (665) | 945 | 1200 | 1155 | 1035 | (1005) | ...... |
| Quakertown Black Shale | ...... | (800) | (800) | ...... | ...... | (660) | 940 | 1195 | 1150 | 1030 | 1000 | ...... |
| Quakertown (Winifrede?) Coal | ...... | (795) | (795) | ...... | ...... | (565) | 850 | 1120 | 1020 | 915 | (870) | ...... |
| Winifrede Limestone | ...... | (770) | (770) | ...... | ...... | (560) | 845 | 1115 | 1015 | 915 | (865) | ...... |
| Williamson Coal | ...... | (750) | (750) | ...... | ...... | ...... | 825 | ...... | 990 | (890) | (840) | ...... |
| Dingess Limestone | ...... | 730 | 730 | ...... | ...... | ...... | 815 | ...... | 980 | (880) | (820) | ...... |
| Gilbert Coal | ...... | (710) | (710) | ...... | ...... | ...... | 800 | ...... | 960 | (875) | (825) | ...... |
| Nuttall Sandstone (Top) | ...... | (700) | (700) | ...... | ...... | ...... | 710 | ...... | 920 | (850) | 770 | ...... |
| Hughes Ferry Coal | ...... | (620) | (620) | ...... | ...... | ...... | 690 | 1105 | 900 | 825 | 750 | ...... |
| Castle Coal | ...... | (600) | (600) | ...... | ...... | ...... | (650) | 1030 | 805 | (740) | 655 | ...... |
| Hartridge Shale | ...... | (580) | (580) | ...... | ...... | ...... | (630) | 1015 | 780 | (700) | 630 | ...... |
| Sewell (Sharon?) Coal | 810 | (575) | (575) | ...... | ...... | 365 | 605 | 965 | 755 | 670 | 605 | ...... |
| Welch Coal | 780 | (550) | (550) | 1150 | ...... | 360 | 660 | 960 | 750 | 665 | 600 | ...... |
| Beckley Coal | ...... | ...... | ...... | ...... | ...... | ...... | (575) | 920 | (725) | (640) | (575) | ...... |
| Fire Creek Coal | 710 | (520) | (520) | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| Pottsville Series (Base) | 700 | (490) | (490) | ...... | ...... | ...... | 535 | 850 | 640 | 600 | 510 | ...... |
| Princeton Sandstone (Top) | 585 | (450) | (450) | 1000 | ...... | 305 | 530 | 830 | 630 | 585 | 500 | ...... |
| Terry Limestone | ...... | ...... | ...... | 950 | ...... | ...... | (480) | 680 | 590 | 540 | 450 | ...... |
| Hinton Limestone (Top) | 85 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| GREENBRIER LIMESTONE (Top) | 0 | 0 | 0 | 100 | ...... | ...... | 50 | 85 | 75 | (60) | 100 | ...... |
| Pocono Series (Top) | 350 | ...... | ...... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Catskill Series (Top) | ...... | ...... | ...... | 250 | 290 | 165 | 290 | 440 | 300 | 250 | 250 | 150 |
| Chemung Series (Top) | ...... | ...... | ...... | 400 | 410 | 430 | 400 | ...... | 410 | 375 | 425 | 425 |
| Hendricks Sandstone (Top) | ...... | ...... | ...... | ...... | 1025 | 930 | 1000 | ...... | ...... | 975 | 925 | 855 |
| Portage Series (Top) | ...... | ...... | ...... | ...... | 1125 | 1030 | (1100) | ...... | ...... | 1075 | 1025 | 955 |
| Corniferous Limestone (Top) | ...... | ...... | ...... | ...... | (4010) | (4030) | (4000) | ...... | ...... | (3975) | ...... | (4025) |
| Oriskany Sandstone (Top) | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 7325 | ...... | ...... |
| | | | | ...... | ...... | ...... | ...... | ...... | ...... | 7475 | ...... | ...... |

## STRUCTURE CONTOURS ON HENDRICKS SANDSTONE.

In the region of Devonian outcrops in western Tucker a fossiliferous and widely persistent sandstone member, first discovered on Close Mountain by the writer, occurs 100 to 300 feet below the top of the Chemung Series, bedded in red shales which much resemble those of the Catskill in their physical appearances, and may belong in that series, depending on whether lithology or fauna be accepted as the criterion, and is a marker of prime importance because of the fact that it is the only generally fossiliferous zone in the several hundred feet of red beds that are found in the upper portion of the Chemung. This horizon was named the **Hendricks Sandstone** because of its good development and easy accessibility near the town of that name, as will be later detailed, and was traced with much care by Dr. Price throughout the region of its outcrop. It is entirely above the summits along the Deer Park Anticline and adjacent high folds but on both descending flanks Dr. Price has prepared structure contours on it which are shown in green and has delineated its outcrop on Map II. His remarks concerning the preparation of the structure map follow:

"Structural contours drawn upon the top of the Hendricks marine faunal sandstone bed of the Chemung are based on a large number of determinations of the position of this bed and upon determinations of the base of the Greenbrier Limestone using the intervals shown in the tables of intervals. In the highly folded region in the western parts of Clover and Licking Districts, there was no control available in areas deeply trenched by streams except occasional dip determinations. Consequently, in these areas the folding is only approximately correct. Few data were available in the southwestern corner of Clover District and it is possible that the Hendricks Sandstone will there be found on the tops of the higher ridges."

## CROSS-SECTIONS.

Three cross-sections have been prepared of the Devonian and other strata of western Tucker, being mainly the work of Dr. Price with certain additions by the writer. All three sections stop at the approximate western limit of the Upper

Freeport (Davis) Coal structure contours, their extension into the eastern region of comparatively shallow folds being considered unnecessary. All these sections are drawn on a vertical scale of 1-62,500, or 5,208 feet to the inch, which is the same as the scale of the topographic maps, and all of them extend approximately at right angles to the line of strike.

**Cross-Section BB′.**—Cross-section BB′, approximately 11 miles long, starts at the extreme northern end of the county and, passing near Leadmine village, terminates at the line 39° 10′ North latitude, just southeast of Backbone Mountain, as shown on Map II.

**Cross-Section CC′.**—Cross-section CC′, approximately 15 miles long, starts at the Preston-Tucker County Line 1½ miles northwest of Hannahsville and, crossing Horseshoe Run 2 miles above its mouth, terminates at the Blackwater River five miles above Hendricks, as shown on Map II.

**Cross-Section DD′.**—Cross-section DD′, approximately 16 miles long, starts with the Laurel Ridge at the common corner of Tucker, Preston, and Barbour Counties and, passing one-half mile southwest of Parsons, crosses McGowan Mountain and terminates at Otter Creek two miles above its mouth, as shown on Map II.

## UNCONFORMITIES.

Unconformities of moderate proportions are numerous in the county. The Allegheny Series, which is commonly 250 feet or more in thickness, is usually less than 150 feet in Tucker, many of its important members having thinned down to almost knife-edge deposits or having disappeared entirely, but it does not appear that either the top or base is generally missing. The next important unconformity, in descending order, occurs at the contact of the Pottsville and Mauch Chunk Series. Inasmuch as the full thickness of the original Mauch Chunk sediments is known at no point in the Appalachian region there are no criteria by which the amount of this unconformity may be determined or even intelligently conjectured.

The lower portion of the Pocono Series appears to be entirely missing in the county. Its common thickness of 500 to 600 feet, as measured at numerous points in counties farther west, has been reduced to a variable figure of 75 to 275 feet, there being nothing left at many points except the pebbly Big Injun Sandstone member at the top of the series.

The Chemung Series of the Devonian in certain localities loses the main portion of the reddish sediments that occur below the Hendricks Sandstone, the principal thinning of these beds being apparently down Cheat River toward the Preston County Line.

## ABSENCE OF FAULTS.

In eastern Tucker no faults of any kind were observed. In western Tucker none was positively identified, although at various points the strata stand vertical or have been overturned, and at some of these localities there might easily be actual displacements that escaped attention.

# CHAPTER IV.

## MEASURED SECTIONS.

### INTRODUCTION.

The surface rocks of Tucker embrace the Quaternary, with Recent and Pleistocene deposits, and a portion of the Paleozoic, with Pennsylvanian, Mississippian, and Devonian sediments. Of the latter period, only the Catskill and the main portion of the Chemung are exposed above drainage, but a record of the strata down through the Oriskany Sandstone is available in the deep well at Parsons.

The following classification of the rocks available for study shows their succession in convenient form, arranged in descending order. The Permo-Carboniferous is included because of the fact that it once evidently covered the county, having been later removed by erosion during the long interval between the deposition of the Pennsylvanian and the Quaternary. Of the Monongahela Series of the Pennsylvanian only 56 feet remain in the top of Fairfax Knob, the summit of which is in Grant County:

| Age. | Period. | Series. |
|---|---|---|
| Quaternary | Recent | |
| | Pleistocene | |
| Paleozoic | Permo-Carboniferous | Dunkard (not found in Tucker) |
| | Pennsylvanian | Monongahela (normally 400′ thick, only lower 56′ found in Tucker) |
| | | Conemaugh (700-825′) |
| | | Allegheny (100-150′) |
| | | Pottsville: |
| | | Kanawha Group (250-300′) |
| | | New River Group (200-300′) |
| | Mississippian | Mauch Chunk (300-800′) |
| | | Greenbrier (150-450′) |
| | | Pocono (100-275′) |
| | Devonian | Catskill (400-800′) |
| | | Chemung (2800-3000′) |
| | | Portage (1450′?) |
| | | Genesee (170′?) |
| | | Hamilton (1000′?) |
| | | Marcellus (Romney) (700′?) |
| | | Corniferous Limestone (155′) |
| | | Oriskany Sandstone (270′) |

The Quaternary Rocks are represented by clays, gravels, and sand beds, present in Tucker along the river and creek bottoms, and by Pleistocene river-terrace deposits of considerable quantity, occupying several higher levels along Cheat River and some of its major tributaries. These two types of recent material are shown on Map II under the general title of Alluvium. As agricultural soil they form a valuable economic resource of the county.

The Dunkard Series, generally recognized as a transitional stage, and therefore classed as of Permo-Carboniferous Age, occurs to a limited extent in both Garrett and Allegany Counties, Maryland, along the North Potomac Syncline northeast of the area under study, and in all probability once covered the entire area of Tucker County. It has now been entirely eroded, its disappearance having presumably been synchronous with the gradual uplift of the strata. The same statement would apply to the upper portion of the Monongahela Series of the Pennsylvanian, which apparently once existed in full thickness over the area, but has now been reduced until only 56 feet of the basal portion remain in the top of Fairfax Knob.

The Conemaugh Series of the Pennsylvanian is present in full development in the vicinity of Fairfax Knob where the North Potomac Syncline crosses the county line, and its lower members extend for several miles southwestward along the same basin and are also found along the Stony River Syncline farther east. Both the Allegheny and Pottsville Series of the same Period are present along portions of the two basins named above, but neither attains its maximum thickness in this region.

The Mauch Chunk, Greenbrier, and Pocono Rocks of the Mississippian Period occur widely throughout the county, the first two named representing an intermediate phase, showing neither maximum nor minimum thicknesses, while the Pocono has thinned out to less than one-half of its customary thickness in other portions of the State.

The Catskill and Chemung Series of the Devonian are well developed in western Tucker along the great uplift of the Cheat River Valley, where a favorable opportunity for their study is afforded. Of the lower members little information is available except from the record of the deep well at Parsons which apparently penetrated nearly to the base of the Oriskany Sandstone.

Numerous geologic cross-sections, consisting of careful hand-level or aneroid measurements of surface strata, often combined with the records of coal test borings, and showing rock successions that range from the Monongahela to the Oriskany, will be given in the following pages.

## MEASURED SECTIONS, LICKING DISTRICT.

Licking District occupies the extreme northwestern corner of the county, embracing a part of the Cheat River drainage system. Its surface rocks range from the lower portion of the Pottsville Series of the Pennsylvanian, down through the Mississippian and into the Devonian partly through the Chemung Series. Owing to the highly folded nature of the strata there are few favorable localities for measuring accurate sections.

The following section, measured with hand-level and arranged in descending order by Dr. Price, starts at an elevation of 1750′ B. on a secondary road south of the forks of Little Wolf Creek and 1 mile southeast of Hardesty, the strike being N. 5° E., dip 1½° W., and direction of traverse N. 55° E. This locality is 2 miles from the Tucker County Line:

## Hardesty Section, Union District, Preston County.

| | Vertical Thickness. Feet. | Total Vertical Thickness. Feet. | Stratigraphic Thickness. Feet. | Total Stratigraphic Thickness. Feet. |
|---|---|---|---|---|
| **Chemung Series (62′)** | | | | |
| Sandstone, light-brown, fine-grained, even-bedded......... | 3 | 3 | 3 | 3 |
| Conglomerate, coarse; thin, oval pebbles of white quartz and smaller round pebbles of the same character; weathers black | 2 | 5 | 2 | 5 |
| Sandstone, gray, fine-grained, even-bedded ................ | 10 | 15 | 10 | 15 |
| Concealed .................... | 14 | 29 | 15 | 30 |
| Sandstone, brown.............. | 4 | 33 | 4 | 34 |
| **Sandstone, Hendricks,** gray, fossiliferous .................... | 1 | 34 | 1 | 35 |
| Sandstone, brown, even-bedded. | 3 | 37 | 3 | 38 |
| Sandstone, green, argillaceous, visible ...................... | 1 | 38 | 1 | 39 |
| Concealed, to turn of road...... | 22 | 60 | 23 | 62 |

The following section, measured with aneroid and arranged in descending order by Dr. Price, starts at a cross-roads (elevation, 2015′ B.) on Sinclair Ridge 0.5 mile northeast of Redhill Church and extends down a public road toward Buffalo Creek, the strike being N. 10° E., observed dip 10° E., calculated dip 7¾°, direction of traverse N. 57° W., and horizontal distance by map 900 feet. This locality is 0.75 mile from the Tucker County Line. The section apparently begins at or near the top of the Chemung Series, although this specific information is not supplied in the notes of Dr. Price:

## Redhill Church Section, Union District, Preston County.

| | Vertical Thick-ness. Feet. | Total Vertical Thick-ness. Feet. | Strati-graphic Thick-ness. Feet. | Total Strati-graphic Thick-ness. Feet. |
|---|---|---|---|---|
| Chemung Series (210.8′) | | | | |
| Shale, yellow and sandstone, shaly ...................... | 3 | 3 | 3.0 | 3.0 |
| Concealed and shale, red....... | 26 | 29 | 58.1 | 61.1 |
| Sandstone, greenish-gray, speckled red. .................. ... | 1 | 30 | 1.0 | 62.1 |
| Sandstone, dark, and concealed. | 5 | 35 | 11.6 | 73.7 |
| Concealed and sandstone, greenish-gray, soft................ | 15 | 50 | 31.6 | 105.3 |
| Horizon of Hendricks Sandstone, supplied from loose blocks of fossiliferous sandstone below this point. Loose boulder of conglomerate sandstone also found here, having descended from a higher horizon........ | 0 | 50 | 0 | 105.3 |
| Shale, red, and sandstone, red, and concealed............... | 50 | 100 | 105.5 | 210.8 |

In the following section, measured with aneroid and arranged in descending order, Nos. 1-10, inclusive, are the observations of the writer, starting at the top of Limestone Mountain, 1.3 miles southwest of Limestone Church and 1.8 miles southward from Hannahsville, and extending southeastward 0.4 mile toward the intersection of a secondary road. Nos. 11-22, inclusive, are the work of Dr. Price, starting with the same stratigraphic horizon as the base of No. 10, where the top of a cliff of limestone forms a broad bench on the mountainside 0.5 mile east of the mouth of Bearwallow Run, and descending the cliff and a small, steep rill which empties into Cheat River from the east at a point opposite the mouth of Licking Creek. Observations have been reduced approximately to true vertical measurement. The section affords a full measurement of the Mauch Chunk, Greenbrier, and Pocono Series, together with the lower portion of the Pottsville and the upper members of the Catskill:

## Limestone Mountain Section, Licking District.

| | Thickness. Feet. | Total Feet. |
|---|---|---|
| **Pottsville Series—Kanawha Group (96′)** | | |
| 1. Sandstone, massive, very pebbly, capping Limestone Mountain, Guyandot | 40 | 40 |
| 2. **Coal, Sewell (Sharon?)** (Prospect No. 105 on Map II) reported (3040′ B.) | 1 | 41 |
| 3. Shale, sandy, partly concealed (2985′ B.) | 55 | 96 |
| **Mauch Chunk Series (305′)** | | |
| 4. Shale, red and concealed | 85 | 181 |
| 5. Sandstone | 10 | 191 |
| 6. Shale, red | 20 | 211 |
| 7. Sandstone, flaggy, shale, green, and sandstone, flaggy | 85 | 296 |
| 8. Shale, red, partly concealed (2680′ B.) | 105 | 401 |
| **Greenbrier Limestone Series (165′)** | | |
| 9. Limestone, hard, gray | 40 | 441 |
| 10. Soil, limy, and concealed | 37 | 478 |
| 11. Limestone in cliff and concealed top forms base of bench | 52 | 530 |
| 12. Limestone, massive, yellowish-brown; top forms base of bench | 8 | 538 |
| 13. Concealed | 20 | 558 |
| 14. Limestone, siliceous, yellowish | 8 | 566 |
| **Pocono Series (250′)** | | |
| 15. Sandstone, soft, cross-bedded, bright-yellow, disintegrating to sand | 7 | 573 |
| 16. Concealed and sandstone | 28 | 601 |
| 17. Sandstone, thin-bedded and ripple-marked, with some shale beds; apparent dip 0 to 4°, depression angle to river from top of unit, 33° | 66 | 667 |
| 18. Limestone, hard, fine-grained, highly arenaceous, gray, lustrous. This is apparently at the horizon of the upper fossiliferous sandstone in Laurel Ridge 2¾ miles southwest of Sugargrove Church | 3 | 670 |
| 19. Shale, yellow, brown and greenish with some thin sandstone beds | 31 | 701 |
| 20. Sandstone, light-brown, fine-grained above, changing to massive below and forming falls; medium-grained, greenish-gray, micaceous, quartzitic, and iron stained | 25 | 726 |
| 21. Alternating beds of massive sandstone, shaly sandstone, and shale; beds green, bright-olive to bluish; dark-gray in upper 10 to 15 feet; a 2-inch conglomerate layer in sandstone near base; highest occurrence of large conglomerate boulders in talus at base of this unit | 90 | 816 |
| **Catskill Series (250′)** | | |
| 22. Concealed to a point on a level with the surface of Cheat River at the mouth of Licking Creek, and 500 feet east of a point directly across the river from the mouth of the creek (1485′ L.) | 250 | 1066 |

The following section, measured with hand-level and arranged in descending order by Dr. Price, starts at a point 35 feet above Cheat River (elevation, 1520′ B.), 0.6 mile due east of the mouth of Bull Run within an entrenched meander where the river is flowing in a southerly direction, and extends downward to the river, the strike being S. 75° E., and observed dip 5° S.:

### Bull Run Section, Licking District.

| | Stratigraphic Thickness. Feet. | Total Stratigraphic Thickness. Feet. |
|---|---|---|
| Chemung Series (35′) | | |
| Sandstone, Hendricks, fossiliferous and conglomeratic; Pelecypoda, aa; bryozoa, aa; Camarotoechia contracta, aa, Orthoceras sp. | 4.0 | 4 |
| Sandstone, conglomeratic | 1.0 | 5 |
| Sandstone | 1.0 | 6 |
| Shale and sandstone, gray | 6.0 | 10 |
| Concealed and sandstone | 4.0 | 14 |
| Shale, red | 6.0 | 20 |
| Concealed, (apparently containing 15′ of thin-bedded, flaggy, fine-grained, red sandstone which outcrops 100 feet east of the measured section) to river level | 15.0 | 35 |

The following section, measured with hand-level and arranged in descending order by Dr. Price, was measured in a cliff on the north bank of Right Fork of Bull Run, 500 feet above the mouth of Left Fork of the same stream, and represents true vertical measurement, the strike being N. 10° E. and observed dip 5° E.:

### Right Fork of Bull Run Section, Licking District.

| | Thickness. Feet. | Total Feet. |
|---|---|---|
| Chemung Series (30′) | | |
| Sandstone, gray, fine-grained | 16 | 16 |
| Sandstone, gray, with some quartz pebbles | 6 | 22 |
| Conglomerate, gray; white quartz pebbles; with Lingula sp. common. Two to three feet thick; elevation, 1555 feet (barometer) above sea; and coming 40′ above Hendricks Sandstone | 2 | 24 |
| Sandstone, gray, fine-grained, flaggy, ripple-marked | 6 | 30 |

## MEASURED SECTIONS, CLOVER DISTRICT.

Clover District lies in the extreme western portion of the County and embraces the main portion of the Clover Run drainage and other tributaries of Cheat River. Its rocks, which range from the Pottsville down nearly to the base of the Chemung Series of the Devonian, have been highly folded so that sections representing true vertical measurements are difficult to obtain.

The following section, measured with foot pacing and aneroid and arranged in descending order by Dr. Price, starts in the ridge road (elevation, 2805′ B.), 0.7 mile southwest of Texas and extends northwestward across a northward flowing branch of Brushy Fork of Teter Creek, to a point in the public road at the eastern foot of Laurel Ridge 1.2 miles due west of Texas, the strike being N. 32° E., observed dip 20° W., and calculated dip 10° W.:

### Texas Section, Clover District.

| | Horizontal Distance. Feet. | Vertical Thickness. Feet. | Stratigraphic Thickness. Feet. | Total Stratigraphic Thickness. Feet. |
|---|---|---|---|---|
| Greenbrier Limestone, above road | ...... | ....... | ...... | ....... |
| **Pocono Series (275.8′)** | | | | |
| Sandstone, yellow and concealed (measured down into Brushy Fork, 25′ vertically, and up the opposite ridge 100′ vertically to its top) Fossil Locality 228 | 550 | 74 | 108.2 | 108.2 |
| Sandstone, fossiliferous, yellow (on ridge top), marine fauna. | 0 | 1 | 1 | 109.2 |
| Sandstone and concealed (descending eastern slope of ridge | 129 | −17 | 47.3 | 156.5 |
| Conglomerate sandstone, white, with large quartz pebbles (lying very nearly parallel to hill slope) ...... ............. | 0 | −3 | 3 | 159.5 |
| Concealed and sandstone, yellow, 12 feet vertically, 34.4 feet horizontally to a small run; thence 17 feet vertically, 50 feet horizontally to a small log house; thence 1144 feet horizontally, 190 feet vertically to fossiliferous sandstone ...... | 1221 | 204.5 | 115.8 | 275.3 |
| Sandstone, yellow, fossiliferous, marine fauna. Fossil Locality 229 ......................... | 0 | 0.5 | 0.5 | 275.8 |
| **Catskill Series (12.7′)** | | | | |
| Shale, red, to public road (2515′ B.) .. ................ | 170 | 31 | 12.7 | 288.5 |

The following section, measured partly with aneroid and partly with hand-level and arranged in descending order by Dr. Price, starts on the side of the mountain just northwest of the mouth of Jonathan Run of Cheat River and 0.7 mile northwest of Auvil, and extends down a small rill to the public road 500 feet north of the run, the direction of traverse being S. 70° E., horizontal distance 100 feet, and computed dip 6° W.:

### Auvil Section, Clover District.

| | Vertical Thickness. Feet. | Total Vertical Thickness. Feet. | Stratigraphic Thickness. Feet. | Total Stratigraphic Thickness. Feet. |
|---|---|---|---|---|
| **Chemung Series (71')** | | | | |
| Sandstone, gray and brown, with brown iron oxide grains ...... | 8 | 8 | 8 | 8 |
| Concealed, containing horizon of **Hendricks Sandstone** at 1765' B. and 18 feet below top of this unit ........................ | 30 | 38 | 32 | 40 |
| Concealed; loose blocks of fossiliferous sandstone appear in soil to top of this unit........ | 12 | 50 | 13 | 53 |
| Sandstone, light-gray, fine-grained | 1 | 51 | 1 | 54 |
| Sandstone, light-brown, fine-grained .................... | 2 | 53 | 2 | 56 |
| Concealed .................... | 9 | 62 | 9 | 65 |
| Sandstone, conglomeratic, brownish-gray, fine-grained matrix with quartz pebbles of pea size | 1.5 | 63.5 | 1.5 | 66.5 |
| Sandstone, weathers shaly..... | 0.5 | 64.0 | 0.5 | 67.0 |
| Sandstone, dark-brown, fine-grained ........ ........... | 4 | 68 | 4 | 71 |

## MEASURED SECTIONS, ST. GEORGE DISTRICT.

St. George District occupies territory on both sides of Cheat River and extends from the Preston County Line southwestward almost to Randolph County. Its surface rocks, which are mainly those of the Devonian Period, have been highly folded, making it impossible to secure vertical sections except by laborious measurement and computation. Along the western slope of Backbone Mountain the rocks of the Mississippian Period outcrop with a steep southeastward dip, capped in turn by the Pottsville which forms the top of the mountain.

The following section, measured with aneroid and arranged in descending order by Dr. Price, starts at the summit of a small knob 1.4 miles N. 41° E. of Auvil, and extends due east down its slope to the public road, the direction of strike being N. 35° E. observed dip 9½° W., and calculated dip 8°W. The section apparently begins near the contact between the Catskill and Chemung Series, although such a statement is not made in the notes of Dr. Price:

**Clay Run Section, St. George District.**

| | Vertical Thickness. Feet. | Total Vertical Thickness. Feet. | Stratigraphic Thickness. Feet. | Total Stratigraphic Thickness. Feet. |
|---|---|---|---|---|
| **Chemung Series (322.4')** | | | | |
| Sandstone, red, thin-bedded, fine-grained and concealed ....... | 30 | 30 0 | 39.4 | 39.4 |
| Sandstone, gray, fine-grained and concealed................ | 40 | 70.0 | 52.7 | 92.1 |
| Sandstone, red and gray, thin-bedded and concealed ....... | 20 | 90.0 | 26.3 | 118.4 |
| **Sandstone, Hendricks,** yellow and gray, conglomeratic, abundant marine fossils; and concealed. Fossils occur in blocks of conglomerate weathering black, and in yellow, fine-grained sandstone..................... | 10 | 100.0 | 13.1 | 131.5 |
| Sandstone, red, thin-bedded. and concealed .................. | 25 | 125 | 32.9 | 164.4 |
| Sandstone, gray, thin-bedded, and concealed .................. | 80 | 205 | 105.3 | 269.7 |
| Concealed. Horizontal distance by map 700' ................ | 40 | 245 | 52.7 | 322.4 |

## MEASURED SECTIONS, BLACK FORK DISTRICT.

Black Fork District occupies the central and southwestern portion of the county, including portions of the drainage of main Cheat River, Shavers Fork, Dry Fork, and Blackwater River. Its surface rocks range from the Pennsylvanian down through the entire Mississippian and 2,000 feet or more into the Devonian. With the exception of the southeastern edge the rocks of the district have been highly folded making sections difficult to obtain.

In the following section, the surface portion was measured with aneroid and clinometer and arranged in descending order by the writer, starting at the Government triangulation point and fire tower on the top of McGowan Mountain, 1.3 miles southward from Hendricks, and extending northward to Dry Fork midway between Hendricks and Hambleton. From this point the traverse is continued northwestward, along the rise of the rocks, a distance slightly in excess of 2½ miles to the mouth of the Parsons Pulp & Lumber Company deep well on Shavers Fork at the southwestern edge of Parsons. The intervals recorded in the upper 1,855 feet of the section, down the mountainside to Dry Fork, are less than true vertical measurement would show, as a slight northwestward rise occurs in this portion and reliable dip angles could not be obtained. The traverse from the foot of the mountain is reduced approximately to true vertical measurement. The subsurface portion of the section, from 4,607 to 8,857 feet, is the record of a deep test drilled for gas by the company named above, having been furnished the Survey by officials of the company. The section affords a measurement of 8.857 feet of strata, exceeding any other recorded to date in the publications of the Survey:

### Parsons Section, Black Fork District.

| | Thickness. Feet. | Total. Feet | Interval. Feet. |
|---|---|---|---|
| **Pottsville Series—Kanawha Group (255')** | | | |
| Sandstone, massive, very pebbly, **Homewood** | 55 | 55 | |
| Bench | 15 | 70 | |
| Sandstone, massive, with small pebbles, **Upper Connoquenessing** | 65 | 135 | |
| Concealed | 65 | 200 | |
| Slate, black, **Quakertown** (3355' B.) | ... | 200 | 200 |
| Concealed in slope | 55 | 255 | |
| **Pottsville Series—New River Group (275')** | | | |
| Sandstone, pebbly, partly concealed, **Nuttall**, etc. | 185 | 440 | |
| Bench, **Sewell Coal horizon?** | 10 | 450 | 250 |
| Concealed in steep bluff | 80 | 530 | |
| **Mauch Chunk Series (585')** | | | |
| Shale, red | 235 | 765 | |
| Sandstone, green, flaggy | 10 | 775 | |
| Shale, red, partly concealed | 340 | 1115 | 665 |
| **Greenbrier Limestone Series (255')** | | | |
| Limestone boulders and limy soil | 255 | 1370 | 255 |

| | Thick-ness. Feet. | Total. Feet | Inter-val Feet. |
|---|---|---|---|
| **Pocono Series (125′)** | | | |
| Sandstone, gray, **Big Injun**, and gray shale, in steep slope | 125 | 1495 | 125 |
| **Catskill Series (722′)** | | | |
| Sandstone, red, flaggy | 5 | 1500 | |
| Shale, red, and concealed | 30 | 1530 | |
| Sandstone, shaly | 15 | 1545 | |
| Shale, red, and red, flaggy sandstone | 180 | 1725 | |
| Sandstone, reddish-brown | 15 | 1740 | |
| Concealed, and red shale and sandstone, to Western Maryland Railway grade | 115 | 1855 | |
| Sandstone, reddish, and red shales along railroad northwestward to line of Catskill-Chemung contact (corrected to vertical measurement) | 362 | 2217 | 722 |
| **Chemung Series (2890′)** | | | |
| Shale, red, and shaly sandstones, with Hendricks Sandstone 100′ below the top (corrected to vertical measurement) | 435 | 2652 | |
| Sandstones, olive-green, and shales, olive-green, with frequent marine fossils, to level of Parsons Pulp & Lumber Company Well (corrected to vertical measurement) | 1955 | 4607 | |
| **Section continued by Parsons Pulp & Lumber Company No. 1 Well Record (1650′ B.):** | | | |
| Conductor | 15 | 4622 | |
| Unrecorded (hole full of water in blue sand at 41′) | 55 | 4677 | |
| Hard boulders and slate | 50 | 4727 | |
| Lime shells | 265 | 4992 | |
| Pink rock | 5 | 4997 | |
| Unrecorded (8″ casing at 475′) | 110 | 5107 | 2890 |
| **Portage Series (1460′)** | | | |
| Lime, gritty (little gas, 500′) | 325 | 5432 | |
| Sand, black, (little gas) | 10 | 5442 | |
| Unrecorded (reduced hole at 940′) | 103 | 5545 | |
| Shale, black, and lime shells, (pocket of gas at 1093′) | 162 | 5707 | |
| Slate | 500 | 6207 | |
| Shale, black | 175 | 6382 | |
| Shells, black, hard | 65 | 6447 | |
| Lime, hard, black | 120 | 6567 | 1460 |
| **Genesee Series (170′)** | | | |
| Slate and shells | 150 | 6717 | |
| Lime, hard, blue | 20 | 6737 | 170 |
| **Hamilton Series (1000′)** | | | |
| Slate, white | 210 | 6947 | |
| Slate, black | 30 | 6977 | |
| Hard, black (slate?) | 130 | 7107 | |
| Slate | 180 | 7287 | |
| Lime, hard, black, gritty | 350 | 7637 | |
| Slate, black, and shells | 100 | 7737 | 1000 |
| **Marcellus (Romney) Series (695′)** | | | |
| Slate, black, with a few shells | 550 | 8287 | |
| Slate and shells | 145 | 8432 | 695 |

| | Thick-ness. Feet. | Total. Feet | Inter-val. Feet. |
|---|---|---|---|
| **Corniferous Limestone Series (155′)** | | | |
| Lime, gritty, Corniferous (gas pocket at 3830′) | 20 | 8452 | |
| Unrecorded | 135 | 8587 | 155 |
| **Oriskany Sandstone Series (270′)** | | | |
| Sand, white, Oriskany (salt water, 3990-4000′) | 80 | 8667 | |
| "Sand shells and slate from that until we got the present sand" | 190 | 8857 | |
| Total depth of hole, 4250′. | | | |

The following section, measured with hand-level and arranged in descending order by Dr. Price, was made in a cut of the Porterwood Lumber Company Railroad on the west side of Shavers Fork of Cheat River, 1 mile N. 70° E. of Pettit, in an eastward meander of the river:

## Pettit Section, Black Fork District.

| | Strati-graphic Thick-ness. Feet. | Total Strati-graphic Thick-ness. Feet. |
|---|---|---|
| **Chemung Series (27.9′)** | | |
| Sandstone, gray, marine fossils; minute bryozoa, of Hendricks Sandstone type, but much smaller, and minute crinoid columns | 8 | 8 |
| Interval | 14 | 22 |
| Conglomerate, 4 inches | 0.4 | 22.4 |
| Shale | 3.1 | 25.5 |
| Sandstone, fossiliferous in top, conglomeratic in lower two inches. At track level, elevation, 1795′ B. | 2.4 | 27.9 |

"340′ above base of reds by 8° dip component; correct by casell; near Hendricks Sandstone but exact relation unknown."

The following section, measured with aneroid and Brunton compass and arranged in descending order by Dr. Price, starts on a raised river terrace (elevation, 1965′ B.), 700 feet east of the mouth of Roaring Run and one-half mile northwest of Hambleton, and extends down the point between Roaring and Falls Runs to the Western Maryland Railway bridge at the mouth of the former stream. From this point the measurements were continued westward along the railroad grade for a distance of 2,060 feet to the eastern end of the first double-walled cut, the strike being S. 49° W., observed dip 10¼° S. and calculated dip 6½° S.:

### Hambleton Section, Black Fork District.

| | Angle of slope. | Horizontal distance. Feet. | Vertical thickness. Feet. | Stratigraphic thickness. Feet. | Total Stratigraphic thickness. Feet. |
|---|---|---|---|---|---|
| **Chemung Series (598.8')** | | | | | |
| River terrace deposits, clay and gravel... ...... | | ...... | 10 | 10 | 10 |
| Concealed in ridge.. | 20 | ...... | 15 | 19.0 | 29.0 |
| Shale, weathers light, yellowish buff..... | 20 | ...... | 5 | 6.3 | 35.3 |
| **Sandstone, Hendricks, fossiliferous; Camarotoechia, bryozoa, pelecypoda** (Fossil Locality 225)...... | 20 | ...... | 0.5 | 0.6 | 35.9 |
| Sandstone, gray, weathering soft, and concealed ......... ... | 20 | ...... | 24.5 | 33.0 | 63.9 |
| Sandstone, red, flaggy, some layers weathering shaly; shaly toward top......... | 27 | ...... | 42 | 53.5 | 122.4 |
| Sandstone and concealed ............ | 25 | ...... | 12 | 15.4 | 137.8 |
| Sandstone, flaggy; cliff-forming sandstone which forms falls near mouth of Falls Run .............. ..... | | ...... | 40 | 42.0 | 179.8 |
| Concealed and shale; with some sandstone beds .............. | 22 | ...... | 13 | 17.4 | 197.2 |
| Sandstone, fine-grained, red, conglomerate layers: fossiliferous, and containing quartz pebbles, yellow nodules of iron oxide and pebbles of green shale; 14" thick (Fossil Locality 227)............ | 22 | ...... | 1 | 1.2 | 198.4 |
| Concealed and shale; with some sandstone beds .............. | 22 | ...... | 10 | 12.7 | 211.1 |
| Sandstone .......... ..... | | ...... | 8 | 8.0 | 219.1 |
| Sandstone, shale, and concealed in ridge. | 15 | ...... | 23 | 31.4 | 250.5 |

| | Angle of slope. | Horizontal distance. Feet. | Vertical thickness. Feet. | Stratigraphic thickness. Feet. | Total Stratigraphic thickness. Feet. |
|---|---|---|---|---|---|
| Sandstone, shale, and concealed | ..... | ...... | 7 | 10 | 260.5 |
| Sandstone, red, and shale, red, in thick beds; top of this unit is top of highway cut | ..... | 11.0 | 30.0 | 31.0 | 291.5 |
| Sandstone, hard, gray, conglomerate, lenticular; with veinlets and nodules of iron oxide, grains of coal, small lumps of a bluish-white phosphatic material resembling weathered fragments of fish remains | ..... | 0.5 | 2.5 | 2.5 | 294.0 |
| Sandstone, shaly, with carbonized plant fragments | ..... | 0 | 0.5 | 0.5 | 294.5 |
| Shale and shaly sandstone | ..... | 7.5 | 7.0 | 7.7 | 302.2 |
| Sandstone, brownish, gray, with nodules of iron oxide, carbonaceous fragments and a few quartz pebbles; conglomeratic in upper portion | ..... | 0 | 4.0 | 4.0 | 306.2 |
| Concealed in road | ..... | 44.0 | 5.0 | 9.7 | 315.9 |
| Concealed in run from grade of concrete highway bridge over Roaring Run to west end of railroad bridge (1690′ B.) | ..... | 265.0 | 14.0 | 42.3 | 358.2 |
| Interval, gray sediments | ..... | 70.0 | 0 | 6.0 | 364.2 |
| Shale, red | ..... | 90.0 | ...... | 7.7 | 371.9 |
| Interval, gray sediments | ..... | 209.0 | ...... | 17.9 | 389.8 |
| Shale, red | ..... | 141.0 | ...... | 12.0 | 401.8 |
| Interval | ..... | 324.0 | ...... | 36.0 | 437.8 |
| Shale, red | ..... | 176.0 | ...... | 19.0 | 456.8 |
| Interval | ..... | 1050.0 | ...... | 142.0 | 598.8 |
| Fossiliferous band in conglomeratic sandstone (Fossil Locality 233) | ..... | ...... | ...... | ...... | ...... |

PLATE V.—View of North Fork of Blackwater River just below Douglas, showing cataract over Homewood Sandstone of Pottsville. Topography of Conemaugh, Allegheny, and Pottsville Series.

The following section, arranged in descending order and measured with aneroid above the top of the Upper Connoquenessing Sandstone and with hand-level below that horizon, starts at the top of a high knob on the western end of Canaan Mountain, 2 miles east of Hendricks, and extends westward to Dry Fork of Cheat River near the old lime-kiln 0.9 mile above the mouth of Blackwater River. Owing to the northwestward rise of the measures intervals are slightly less than true vertical measurement would show:

### Hendricks Section, Black Fork District.

| | Thickness. Feet. | Total. Feet. | Interval Feet. |
|---|---|---|---|
| **Pottsville Series—Kanawha Group (388′)** | | | |
| Sandstone, massive, pebply, capping knob...... 50′ | | | |
| Concealed ............. 15 } **Homewood..** | 100 | 100 | |
| Sandstone, massive, pebbly cliff............... 35 | | | |
| Concealed ................................ | 15 | 115 | |
| Sandstone, massive, cliff rock, small pebbles... 65′ } **Upper** | | | |
| **Connoque-** | | | |
| Concealed .............. 11 } **nessing ....** | 93 | 208 | 208 |
| Sandstone, massive, coarse, cliff........... 17 | | | |
| Concealed and sandy shale in slope....... | 70 | 278 | |
| Sandstone, massive, cliff, **Lower Gilbert?..** | 33 | 311 | |
| Concealed, with shale.................... | 57 | 368 | |
| Slate, black, at old prospect, (No. 94 on Map II) **Gilbert Coal horizon?**........... | ... | 368 | 160 |
| Concealed in steep slope................. | 20 | 388 | |
| **Pottsville Series—New River Group (139′)** | | | |
| Sandstone, concealed, and sandstone, **Nuttall and Guyandot**..................... | 60 | 448 | |
| Shale, sandy, plant fossils at base, **Hartridge** ................................ | 8 | 456 | |
| **Coal**, medium-soft ........ 2′ 4″ } (4′ 0″) **Sewell** | | | |
| Slate, gray.... 0 4 } **(Sharon?)** (2740′ B.) | 4 | 460 | 92 |
| **Coal**, bony.... 1 4 } J. P. Scott et al. Mine (No. 112 on Map II) | | | |
| Concealed and shale, gray, (2673′ B.)...... | 67 | 527 | 67 |
| **Mauch Chunk Series (540′)** | | | |
| Shale, red................................ | 22 | 549 | |
| Concealed, mainly, with red shale and sandstone outcroppings..................... | 518 | 1067 | 540 |
| **Greenbrier Limestone Series (290′)** | | | |
| Limestone, concealed, and limestone...... | 85 | 1152 | |
| Concealed ............................ | 20 | 1172 | |
| Limestone ............................ | 30 | 1202 | |

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| Concealed | 20 | 1222 | |
| Limestone | 15 | 1237 | |
| Shale, red and limy | 20 | 1257 | |
| Limestone | 5 | 1262 | |
| Sandstone, limy | 5 | 1267 | |
| Shale, sandy and limy | 20 | 1287 | |
| Limestone, hard, gray, cliff | 70 | 1357 | 290 |
| **Pocono Sandstone Series (114′)** | | | |
| Sandstone, massive, pebbly, **Big Injun** | 20 | 1377 | |
| Concealed | 94 | 1471 | 114 |
| **Catskill Series (51′)** | | | |
| Shale, red | 10 | 1481 | |
| Sandstone, shaly, with limy streaks | 20 | 1501 | |
| Shale, red | 6 | 1507 | |
| Concealed to Dry Fork | 15 | 1522 | |

The following section, measured with aneroid and arranged in descending order, starts at the top of a spur of Canaan Mountain, 1.2 miles southeast of the mouth of Laurel Run of Dry Fork and 2.8 miles southeast of Hendricks, and extends westward to Dry Fork at the mouth of a ravine 0.5 mile above Laurel Run. Owing to the northwestward rise of the rocks intervals are slightly less than true vertical measurement would show:

### Laurel Run of Dry Fork Section, Black Fork District.

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| **Allegheny Series (140′)** | | | |
| Sandstone, massive, pebbly, **Upper Freeport**, capping high point | 80 | 80 | |
| Concealed, and fire clay, flinty | 55 | 135 | |
| **Coal**, visible, 3′ 0″, reported .. 4′ 0″; Slate, black 0 4; **Coal** ...... 0 4 — (4′ 8″) **Lower Kittanning** (3180′ B.) Dobbin Manor Prospect (No. 76 on Map II) | 5 | 140 | 140 |
| **Pottsville Series—Kanawha and New River Groups (560′)** | | | |
| Sandstone, pebbly, cliff, **Homewood** | 40 | 180 | |
| Concealed | 235 | 415 | |
| Concealed, with shale | 45 | 460 | |
| Sandstone, shaly, **Guyandot** | 20 | 480 | |
| Shale, sandy, **Skelt** | 28 | 508 | |
| **Coal** ...... 0′ 2″; Shale, gray 1 0; **Coal** ...... 0 5 — (1′ 7″) **Sewell "B"** (Exposure No. 104 on Map II) | 2 | 510 | 370 |

| | Thickness. Feet. | Total. Feet | Interval. Feet. |
|---|---|---|---|
| Sandstone, massive, pebbly, cliff, **Lower Guyandot** | 20 | 530 | |
| Concealed | 10 | 540 | |
| Shale, dark, sandy, **Hartridge** | 10 | 550 | |
| **Coal**, reported .. 1' 8" / Slate, gray, reported. 1 6 / **Coal**, reported .. 1 9 } (4' 11") **Sewell (Sharon?)** (2765' B.) Dobbin Manor Prospect (No. 113 on Map II) | 5 | 555 | 45 |
| Concealed, yellow soil (2620' B.) | 145 | 700 | 145 |
| **Mauch Chunk Series (670')** | | | |
| Shale, red, partly concealed (1950' B.) | 670 | 1370 | 670 |
| **Greenbrier Limestone Series (225')** | | | |
| Limestone, and shale, partly concealed | 140 | 1510 | |
| Limestone cliff, with streaks of shale (exposed on west side) | 75 | 1585 | |
| Concealed to Dry Fork River, (1725' B.) | 10 | 1595 | 225 |

The following section, measured with hand-level and arranged in descending order, starts at the triangulation point on the south end of Backbone Mountain, 2.8 miles northeast of Hendricks, and extends southward to Blackwater River, 1.8 miles above its mouth. Owing to the southeastward dip of the rocks, the recorded intervals in the Pottsville and lower series are slightly in excess of what true vertical measurement would show:

### Backbone Mountain Section, Black Fork District.

| | Thickness. Feet. | Total. Feet | Interval. Feet. |
|---|---|---|---|
| **Allegheny Series (126')** | | | |
| Sandstone, massive, with large white pebbles 1" diameter, capping knob, **Upper Freeport** (top, 3661' L.) | 40 | 40 | |
| Concealed along ridge | 86 | 126 | 126 |
| **Pottsville Series—Kanawha Group (325')** | | | |
| Sandstone, massive, soft, white, with small pebbles, **Homewood** | 75 | 201 | |
| Concealed | 250 | 451 | |
| **Coal blossom, Gilbert** (Exposure No. 92 on Map II) (3210' B.) | ... | 451 | 325 |
| **Pottsville Series—New River Group (260')** | | | |
| Sandstone, massive, gray, cliff rock, **Nuttall** | 35 | 486 | |
| Concealed | 125 | 611 | |
| Sandstone, massive, coarse, gray, small pebbles, **Upper Raleigh** (**Sharon?**) (2950' B.) | 100 | 711 | 260 |

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| **Mauch Chunk Series (790′)** | | | |
| Concealed | 130 | 841 | |
| Sandstone, green, flaggy | 5 | 846 | |
| Concealed | 35 | 881 | |
| Sandstone, green, flaggy, fine | 35 | 916 | |
| Concealed | 50 | 966 | |
| Sandstone, reddish-green, flaggy, fine, partly concealed | 50 | 1016 | |
| Shale, red, partly concealed | 65 | 1081 | |
| Sandstone, reddish-green, flaggy, fine | 40 | 1121 | |
| Shale, red, partly concealed | 160 | 1281 | |
| Sandstone, green, flaggy | 35 | 1316 | |
| Concealed, with red shale | 170 | 1486 | |
| Sandstone, reddish-green, fine | 5 | 1491 | |
| Concealed (2160′ B.) | 10 | 1501 | 790 |
| **Greenbrier Limestone Series (235′)** | | | |
| Limestone | 5 | 1506 | |
| Concealed | 15 | 1521 | |
| Limestone, shaly, partly concealed | 115 | 1636 | |
| Limestone, hard, gray (1925′ B.) | 100 | 1736 | 235 |
| **Pocono Sandstone Series (84′)** | | | |
| Sandstone, massive, with oblong, flattened quartz pebbles, **Big Injun**, to railroad grade (1890′ B.) | 35 | 1771 | |
| Concealed to Blackwater River | 49 | 1820 | |

## MEASURED SECTIONS, FAIRFAX DISTRICT.

Fairfax District is situated in the northern portion of the county next to the southwestern corner of the State of Maryland, and mainly includes the drainage area of North Fork of Blackwater River. It lies within the basin of the North Potomac Syncline, the outcropping rocks belonging almost entirely to the Pennsylvanian Period, with a comparatively gentle pitch.

In the following section, arranged in descending order, the upper portion, comprising 296 feet, starts at the top of a knob 0.5 mile westward from Coketon, and extends southeastward to the base of the Upper Freeport (Davis) Coal at the Davis Coal & Coke Company No. 37 mine (No. 48 on Map II), on North Fork of Blackwater, one-fourth mile below Coketon, the measurement being by hand-level. The Buffalo Sandstone, Brush Creek Shale and Brush Creek Coal are inserted from an outcrop along the Davis Branch of the Western Maryland Railway on the eastern side of North Fork opposite the mine mentioned, this stage being concealed on the west side. The lower portion was measured partly with hand-level and partly with aneroid at certain other points farther southwest along North Fork of Blackwater, as fully described in the section, much care having been taken to connect each group of observations with the base horizon of the Upper Freeport (Davis) Coal so that duplication of strata would be impossible. All measurements were made on the strike of the rocks thereby insuring true vertical intervals. This section was measured with much care and together with the Fairfax Section, published on a subsequent page, is the basis for the correlation of the Pennsylvanian sediments of the county:

### Douglas Section, Fairfax District.

| Conemaugh Series (285') | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| Sandstone, grayish-brown, Grafton, capping knob ½ mile west of Coketon | 5 | 5 | |
| Shale, green, fossiliferous (?), Ames | 10 | 15 | |
| Coal streak, Harlem, (3171' B.) | ... | 15 | 15 |
| Concealed and red shale, Pittsburgh Reds | 30 | 45 | |
| Concealed | 40 | 85 | |
| Sandstone, Saltsburg | 10 | 95 | |
| Shale, dark | 7 | 102 | |
| Coal, soft .. 2' 10"; Slate, dark 0 3; Coal, soft . 3 10 — (6' 11") Bakerstown (Thomas) (3067' B.) Davis Coal & Coke Company No. 27 Mine (No. 12 on Map II) | 7 | 109 | 94 |
| Concealed | 39 | 148 | |
| Sandstone, shaly, Buffalo | 7 | 155 | |
| Shale, dark, sandy, with marine fossils, Brush Creek | 7 | 162 | |
| Coal. 0' 1"; Shale 0 4; Coal. 1 4 — (1' 9") Brush Creek Western Maryland Railway Exposure (No. 26 on Map II) | 2 | 164 | 55 |
| Concealed and shale | 44 | 208 | |
| Shale, red, Mahoning (probably red from oxidation) | 5 | 213 | |
| Shale, sandy | 5½ | 218½ | |
| Coal, (0' 6"), Mahoning (Exposure No. 22 on Map II) | 0½ | 219 | |
| Shale and concealed | 16 | 235 | |
| Sandstone, massive, gray, pebbly, Lower Mahoning (supplied from neighboring outcrop) 30' to | 47 | 282 | |
| Shale, dark, Uffington | 3 | 285 | |

| | Thickness. Feet. | Total. Feet. | Interval. Feet |
|---|---|---|---|
| Allegheny Series (153′) | | | |
| Coal, soft.......... 1′ 3″ ⎫ (11′ 3″) Upper | | | |
| Slate, dark......... 0 2 ⎪ Freeport (Davis) | | | |
| Coal, soft, columnar 3 7 ⎪ (2880′ B.) Davis | | | |
| Shale, gray......... 3 7 ⎬ Coal and Coke | 11 | 296 | 132 |
| Coal, soft.......... 1 5 ⎪ Company Mine | | | |
| Slate, dark......... 0 3 ⎪ No. 37 (No. 48 on | | | |
| Coal, soft.......... 1 0 ⎭ Map II) | | | |
| Section continued by exposure east of North Fork of Blackwater River and ½ mile southwest of Coketon, starting with Upper Freeport (Davis) Coal; hand-level measurement: | | | |
| Fire clay shale, with ferriferous limestone, Upper Freeport (this limestone at some points consists of two benches each 1′ thick separated by 3′ to 10′ of shale).... | 12 | 308 | |
| Sandstone, massive, Upper Freeport...... | 15 | 323 | |
| Shale, sandy.......................... .... | 8 | 331 | |
| Limestone ............................. | 1 | 332 | |
| Shale, dark, Lower Freeport Coal horizon.. | 7 | 339 | 43 |
| Fire clay, plastic, with ferriferous limestone, Lower Freeport.................. | 6 | 345 | |
| Fire clay, flinty.. 1′ ⎫ Lower Freeport...... <br> Fire clay, plastic. 5 ⎭ | 6 | 351 | |
| Sandstone, shaly, Lower Freeport......... | 6 | 357 | |
| Slate, black........................... | 3 | 360 | |
| Shale, dark, sandy, ferruginous........... | 12½ | 372½ | |
| Coal ........ 0′ 10″ ⎫ (2′ 10″) Upper Kittan- | | | |
| Shale, gray.. 0 3 ⎪ ning West Virginia | | | |
| Coal ........ 0 8 ⎬ Central & Pittsburgh | 3 | 375½ | 36½ |
| Slate, dark... 0 1 ⎪ Railway Exposure | | | |
| Coal ........ 1 0 ⎭ (No. 73 on Map II) | | | |
| Fire clay shale......................... | 0½ | 376 | |
| Limestone, gray, shaly, Johnstown........ | 3 | 379 | |
| Fire clay shale......................... | 2 | 381 | |
| Section continued by exposure east of North Fork and just southeast of Douglas (hand-level measurement) starting at same stratigraphic horizon, with check measurement to Upper Freeport (Davis) Coal): | | | |
| Coal, Middle Kittanning, very slaty, bone at middle, Cumberland Coal Co. Exposure (No. 75 on Map II).................... | 1 | 382 | 6½ |
| Fire clay, sandstone, and shale........... | 5 | 387 | |
| Slate, black, with coal streaks............ | 1 | 388 | |
| Fire clay shale......................... | 4 | 392 | |
| Shale, sandy........................... | 6 | 398 | |
| Coal .....0′ 3″ ⎫ (0′ 10″) Lower Kittanning, | | | |
| Shale .. 0 3 ⎬ Cumberland Coal Co. Ex- | 1 | 399 | 17 |
| Coal .... 0 4 ⎭ posure (No. 78 on Map II) | | | |
| Shale, sandy........................... | 6 | 405 | |
| Sandstone, massive, Kittanning........... | 22 | 427 | |

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| Coal .....0′ 5″ / Shale, dark . 0 4 / Coal .... 0 3 } (1′ 0″) Clarion, Cumberland Coal Co. Exposure (No. 83 on Map II) | 1 | 428 | 29 |
| Shale, sandy, dark........................ | 10 | 438 | 10 |
| Section continued starting at point 0.5 mile northwest of the forks of Blackwater River and extending southeastward to the forks; aneroid measurement: | | | |
| Pottsville Series—Kanawha Group (310′) | | | |
| Sandstone, massive, pebbly, cliff, Homewood | 75 | 513 | |
| Coal, Upper Mercer, and black slate with numerous plant fossils.................. | 1 | 514 | 76 |
| Sandstone, massive, pebbly, great cliff, Upper Connoquenessing.................... | 126 | 640 | |
| Shale, dark, sandy 4′ / Slate, black, with Naiadites fossils 0½ / Shale, dark....... 8 } Quakertown (Details supplied from falls of North Fork, 0.5 mile north of forks) | 12½ | 652½ | |
| Coal, Quakertown (Winifrede?) (0′ 6″) Western Maryland Railway Exposure (No. 88 on Map II)...................... | 0½ | 653 | 139 |
| Fire clay shale.......................... | 2½ | 655½ | |
| Iron ore, Winifrede Limestone horizon.... | 0½ | 656 | |
| Fire clay shale.......................... | 2 | 658 | |
| Shale, black with numerous plant fossils at top, Blackwater (Dingess?)............. | 30 | 688 | |
| Sandstone, massive, Lower Gilbert........ | 25 | 713 | |
| Shale, dark, sandy, Gilbert................ | 35 | 748 | |
| Pottsville Series—New River Group (210′) | | | |
| Sandstone, great pebbly cliff, Upper and Lower Nuttall........................... | 80 | 828 | |
| Concealed ................................ | 13 | 841 | |
| Shale, dark, sandy, with plant fossils...... | 15 | 856 | |
| Sandstone, shaly, Lower Guyandot........ | 10 | 866 | |
| Shale, dark, with plant fossils and iron ore, Hartridge ............................ | 1 | 867 | |
| Coal, soft.. 0′ 11″ / Coal, bony. 0 3 } (1′ 2″) Sewell (Sharon?) Western Maryland Railway Exposure (No. 111 on Map II) | 1 | 868 | 215 |
| Fire clay shale, with plant rootlets...... . | 2 | 870 | |
| Shale, dark, bituminous, Welch Coal horizon | 3 | 873 | |
| Shale, sandy.............................. | 12 | 885 | |
| Sandstone, massive, pebbly, Upper Raleigh (Sharon?) ............................ | 38 | 823 | |
| Slate, black, with streaks of coal, Fire Creek, (Exposure No. 131 on Map II)........... | 2 | 925 | 57 |
| Concealed ................................ | 13 | 938 | |
| Sandstone, massive, pebbly, Pineville..... | 20 | 958 | |
| Mauch Chunk Series (25′) | | | |
| Shale, green, sandstone, and concealed, to forks of Blackwater.................... | 25 | 983 | |

The following section is the record of the Davis Coal & Coke Company No. 11 Coal Test Boring (No. 15 on Map II) located on a small ravine east of North Fork and 1.3 miles northeast of Thomas Station, and reveals many details of the Conemaugh Series:

### Thomas Section, Fairfax District.

| | Thickness. Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| **Conemaugh Series (431′ 1″)** | | | | | | |
| Clay, yellow | 9 | 0 | 9 | 0 | | |
| Sand and gravel | 6 | 0 | 15 | 0 | | |
| Shale, gray | 3 | 0 | 18 | 0 | | |
| Sandstone | 6 | 0 | 24 | 0 | | |
| Shale, sandy | 4 | 0 | 28 | 0 | | |
| Shale, dark-gray | 3 | 0 | 31 | 0 | | |
| Shale, sandy | 4 | 0 | 35 | 0 | | |
| Shale, gray | 19 | 0 | 54 | 0 | | |
| Shale, sandy | 3 | 0 | 57 | 0 | | |
| Sandstone 6′ 0″ | | | | | | |
| Sandstone, medium-hard 12 0 | | | | | | |
| Sandstone coarse 8 0 — **Grafton** | 56 | 0 | 113 | 0 | | |
| Shale, sandy 15 0 | | | | | | |
| Shale, mixed 5 0 | | | | | | |
| Sandstone 10 0 | | | | | | |
| Shale, dark 9′ 0″ | | | | | | |
| Shale, sandy 9 0 — **Ames** | 24 | 2 | 137 | 2 | | |
| Shale, dark 6 2 | | | | | | |
| **Coal, Harlem** | 0 | 10 | 138 | 0 | 138′ | 0 |
| Shale, dark 10′ 0″ — **Pittsburgh** | | | | | | |
| Shale, blue 12 0 — **Reds** | 55 | 0 | 193 | 0 | | |
| Shale, mixed 6 0 | | | | | | |
| Shale, blue 27 0 | | | | | | |
| Sandstone, blue, **Jane Lew** | 12 | 0 | 205 | 0 | | |
| Shale, sticky 4′ 0″ — **Pittsburgh** | | | | | | |
| Shale, sticky 13 0 — **Reds** | 27 | 0 | 232 | 0 | | |
| Shale, gray 10 0 | | | | | | |
| Sandstone, **Saltsburg** | 4 | 0 | 236 | 0 | | |
| Shale, dark | 8 | 0 | 244 | 0 | | |
| **Coal** 2′ 2″ | | | | | | |
| **Bone coal** 0 5 | | | | | | |
| **Coal** 0 6 — **Bakerstown** | | | | | | |
| **Bone coal** 0 9 — **(Thomas)** | 8 | 4 | 252 | 4 | 114 | 4 |
| **Coal** 0 4 | | | | | | |
| **Bone coal** 0 5 | | | | | | |
| **Coal** 3 9 | | | | | | |
| Shale, soft, gray | 27 | 8 | 280 | 0 | | |
| Sandstone, hard, **Buffalo** | 33 | 0 | 313 | 0 | | |
| Shale, gray | 5 | 0 | 318 | 0 | | |
| Shale, gray, sandy, **Brush Creek** | 24 | 0 | 342 | 0 | | |
| Shale, soft, sticky, **Brush Creek Coal horizon** | 8 | 0 | 350 | 0 | 97 | 8 |

| | Thickness. Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| Shale, blue | 10 | 0 | 360 | 0 | | |
| Shale, mixed | 5 | 0 | 365 | 0 | | |
| Shale, gray | 13 | 0 | 378 | 0 | | |
| Shale, sandy | 5 | 0 | 383 | 0 | | |
| Sandstone, Upper Mahoning | 14 | 0 | 397 | 0 | | |
| Shale, gray | 6 | 0 | 403 | 0 | | |
| Sandstone .. 7′ 0″; Shale, sandy 4 0; Sandstone .. 16 0 } Lower Mahoning | 27 | 0 | 430 | 0 | | |
| Shale, dark, Uffington | 1 | 1 | 431 | 1 | | |
| **Allegheny Series (15′ 11″)** | | | | | | |
| Coal ........ 0′ 2″; Bone ....... 0 3; Shale binder. 0 4; Coal ........ 3 4; Shale, dark.. 6 9; Coal ........ 1 11; Bone coal.... 0 1; Coal ........ 1 5 } Upper Freeport (Davis) | 14 | 3 | 445 | 4 | 95 | 4 |
| Shale to bottom | 1 | 8 | 447 | 0 | | |

"Completed, June, 1910; surface elevation of boring, 3100' L".

In the following section, arranged in descending order, the surface portion was measured with hand-level and starts at the top of Fairfax Knob just southeast of the common corner of Tucker, Preston, and Garrett Counties, the first 134 feet of strata being exposed southeast of the knob toward Fairfax Summit, approximately along the line of Tucker and Grant Counties. Exposures between 134 feet and 288 feet were secured northeast of the knob, with a careful check measurement to the Pittsburgh Coal to avoid duplication of strata. The coal which appears at 200 feet has been provisionally correlated with the Upper Hoffman of the Maryland Survey, its identification being subject to doubt as it is not found in the Conemaugh Series as heretofore studied in West Virginia, and apparently does not occur west of this point. The sub-surface portion of the section is the record of the Davis Coal & Coke Company No. 48 Coal Test Boring (No. 39 on Map II), located 0.3 mile northeast of the Knob, which starts at the base of the hand-leveled measurement. Being near the center of the basin where there is only a slight dip, the section shows approximately true vertical intervals:

## Fairfax Section, Fairfax District.

| | Thickness. Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| **Monongahela Series (56′)** | | | | | | |
| Sandstone, gray, **Upper Pittsburgh**, and concealed from top of Fairfax Knob.. | 36 | 0 | 36 | 0 | | |
| **Coal** .. 0′ 10″<br>Shale . 1 3<br>**Coal** .. 0 3<br>} **Pittsburgh "Rider"** Davis Coal & Coke Company Exposure (No. 1 on Map II) | 2 | 4 | 38 | 4 | | |
| Shale, gray.......................... | 5 | 3 | 43 | 7 | | |
| **Coal** ....... 0′ 6″<br>Shale, gray 0 2<br>**Coal** ...... 9 9<br>Shale, gray 1 0<br>**Coal** ...... 1 0<br>} **Pittsburgh** (3197′ L.) Davis Coal & Coke Company Mine (No. 2 on Map II) | 12 | 5 | 56 | 0 | 56 | 0 |
| **Conemaugh Series (838′ 6½″)** | | | | | | |
| Concealed .......................... | 6 | 0 | 62 | 0 | | |
| Limestone, **Fairfax**.................. | 2 | 0 | 64 | 0 | | |
| Concealed .......................... | 2 | 8 | 66 | 8 | | |
| **Coal, Morantown** (of Maryland Survey), fallen shut (3182′ L.) Davis Coal & Coke Company, No. 60 (?) Mine (No. 3 on Map II) reported.............. | 4 | 4 | 71 | 0 | 15 | 0 |
| Concealed .......................... | 46 | 0 | 117 | 0 | | |
| Sandstone, and sandy shale, **Lower Pittsburgh** .......................... | 9 | 1 | 126 | 1 | | |
| Shale, dark, with coal streaks......... | 1 | 6 | 127 | 7 | | |
| **Coal**, hard.... 0′ 8″<br>Shale, dark... 1 8<br>**Coal**, good, soft 3 0<br>Shale, gray... 0 6<br>**Coal** ......... 0 7<br>} **Little Pittsburgh** (3119′ L.) Davis Coal & Coke Company No. 61 Mine (No. 4 on Map II) | 6 | 5 | 134 | 0 | 63 | 0 |
| Concealed .......................... | 19 | 0 | 153 | 0 | | |
| Shale, gray, sandy.................... | 15 | 0 | 168 | 0 | | |
| Shale, dark, with plant fossils......... | 4 | 8 | 172 | 8 | | |
| **Coal** .... 1′ 0″<br>**Slate**, dark.. 0 1<br>**Coal** .... 0 3<br>} **Little Clarksburg** (**Franklin** ? of Maryland) Davis Coal & Coke Co. Exposure (No. 5 on Map II) | 1 | 4 | 174 | 0 | 40 | 0 |
| Shale, gray, and concealed............ | 26 | 0 | 200 | 0 | | |
| Coal opening, fallen shut not much found? **Upper Hoffman** (of Maryland Survey) Davis Coal & Coke Company Exposure (No. 6 on Map II)......... | ... | .. | 200 | 0 | 26 | 0 |
| Concealed .......................... | 88 | 0 | 288 | 0 | | |
| **Continued by Davis Coal & Coke Company Core Test No. 48 (No. 39 on Map II) (2966′ L.):** | | | | | | |
| Sand and gravel...................... | 23 | 0 | 311 | 0 | | |
| Shale, gray, broken.................. | 23 | 0 | 334 | 0 | | |
| Shale, red, broken................... | 10 | 0 | 344 | 0 | | |
| Shale, blue.......................... | 43 | 0 | 387 | 0 | | |
| Shale, gray.......................... | 2 | 0 | 389 | 0 | | |
| Shale, red........................... | 4 | 0 | 393 | 0 | | |

| | Thickness. Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| Shale, gray, hard | 28 | 0 | 421 | 0 | | |
| Shale, blue | 23 | 0 | 444 | 0 | | |
| Shale, muddy | 10 | 0 | 454 | 0 | | |
| Shale, dark | 10 | 0 | 464 | 0 | | |
| Shale, black | 3 | 6 | 467 | 6 | | |
| **Coal, Elk Lick (Barton)** | 0 | 4 | 467 | 10 | 267 | 10 |
| Slate, dark | 3 | 2 | 471 | 0 | | |
| Shale, gray..... 32′ 0″ | | | | | | |
| Shale, blue..... 10 0 | | | | | | |
| Shale, red...... 3 0 | | | | | | |
| Mud shale...... 22 0 | | | | | | |
| Birmingham.. | 67 | 0 | 538 | 0 | | |
| Sandstone, Grafton | 4 | 0 | 542 | 0 | | |
| Shale, gray | 10 | 0 | 552 | 0 | | |
| Slate, black, Ames | 17 | 0 | 569 | 0 | | |
| **Coal, Harlem** | 1 | 6 | 570 | 6 | 102 | 8 |
| Slate, black........ 2′ 6″ | | | | | | |
| Shale, gray........ 8 0 | | | | | | |
| Shale, gray, broken 20 0 | | | | | | |
| Shale, red......... 5 0 | | | | | | |
| Sand shale......... 9 0 | | | | | | |
| Shale, gray........ 29 0 | | | | | | |
| Shale, red......... 8 0 | | | | | | |
| Pittsburgh Reds ..... | 81 | 6 | 652 | 0 | | |
| Shale, gray | 22 | 0 | 674 | 0 | | |
| Sandstone, Saltsburg | 10 | 0 | 684 | 0 | | |
| Shale, gray, horizon of Bakerstown (Thomas) Coal | 27 | 0 | 711 | 0 | 140 | 6 |
| Shale, broken | 24 | 0 | 735 | 0 | | |
| Sandstone, Buffalo | 7 | 0 | 742 | 0 | | |
| Shale, gray | 17 | 0 | 759 | 0 | | |
| Sand shale | 10 | 0 | 769 | 0 | | |
| Slate, black. Brush Creek | 13 | 0 | 782 | 0 | | |
| **Coal, Brush Creek** | 1 | 8 | 783 | 8 | 72 | 8 |
| Slate, dark | 2 | 4 | 786 | 0 | | |
| Shale, gray | 9 | 0 | 795 | 0 | | |
| Sandstone, Upper Mahoning | 20 | 0 | 815 | 0 | | |
| Shale, gray | 20 | 0 | 835 | 0 | | |
| Sand shale | 25 | 0 | 860 | 0 | | |
| Sandstone, very hard, Lower Mahoning | 8 | 0 | 868 | 0 | | |
| Shale, gray........ 9′ 0 ″ | | | | | | |
| Slate, dark........ 3 0 | | | | | | |
| Coal .............. 0 6 | | | | | | |
| Slate, black....... 1 6 | | | | | | |
| Slate, dark.......12 6½ | | | | | | |
| Uffington Shale ..... | 26 | 6½ | 894 | 6½ | | |
| **Allegheny Series (22′ 11″)** | | | | | | |
| Coal ............... 2′ 1 ″ | | | | | | |
| Binder ............. 0 1½ | | | | | | |
| Coal ............... 3 1 | | | | | | |
| Slate .............. 2 9 | | | | | | |
| Coal ............... 4 4½ | | | | | | |
| Slate .............. 2 0½ | | | | | | |
| Coal ............... 0 6 | | | | | | |
| Upper Freeport (Davis) | 14 | 11½ | 909 | 6 | 125 | 10 |
| Slate, gray | 7 | 11½ | 917 | 5½ | | |

## MEASURED SECTIONS, DAVIS DISTRICT.

Davis District occupies the northeastern portion of the county, embracing a portion of the Blackwater River drainage. The rocks of the Pennsylvanian Period occur in its western third and extend around the northern and down the eastern end in a narrow fringe, but have been eroded completely from the central belt where the Blackwater Anticline brings the Mississippian to the surface.

The following section, measured with hand-level and arranged in descending order, starts at the top of the plateau 1.5 miles southwest of Davis and extends southeastward to the base of the falls of Blackwater River, indicating the stratum that is responsible for that interesting natural feature:

### Blackwater Falls Section, Davis District.

| | | Thickness. Feet. | Total Feet. |
|---|---|---|---|
| **Pottsville Series—Kanawha Group (174')** | | | |
| Sandstone, massive, cliff, Homewood, forms top of plateau | | 40 | 40 |
| Concealed | | 22 | 62 |
| Sandstone, cliff, above falls. 40' | Upper Connoquenessing | 112 | 174 |
| Sandstone, cliff, in falls.... 57 | | | |
| Sandstone, massive, in rapids below falls........ 15 | | | |

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau fronting Blackwater River 2 miles southwest of Davis and extends southward into the gorge of the river. The correlation of the shale and limestone occurring at 264-280 feet is subject to some doubt, as there are several fossiliferous zones in the Kanawha Group farther southwest in the State that might easily come at this horizon, principal among which are the Dingess Limestone and the Eagle Shale and Limestone. This exposure has been tentatively classified as in the Blackwater Shale and Limestone, however, its identity with the Dingess Limestone being suggested because of its lithologic character and because of the fact that the Dingess appears to preserve its fossiliferous character farther northeast than the Eagle in Nicholas County where both horizons have been identified with certainty:

### Davis Section, Davis District.

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| **Pottsville Series—Kanawha Group (305')** | | | |
| Sandstone, massive, pebbly, cliff, Homewood (top, 3125' B.) | 55 | 55 | |
| Shale, sandy, with plant fossils, Kanawha Black Flint horizon | 10 | 65 | |
| Sandstone, great pebbly cliff, Upper Connoquenessing (2965' B.) | 95 | 160 | |
| Shale, gray, Quakertown | 2 | 162 | |
| Concealed, Quakertown (Winifrede?) Coal horizon | 3 | 165 | 165 |
| Sandstone, massive | 5 | 170 | |
| Concealed, with black shale | 82 | 252 | |
| Shale, sandy | 3 | 255 | |
| Shale, dark, with fine coal spars, Williamson | 5 | 260 | |
| Sandstone, massive | 4 | 264 | |
| Shale, dark, with marine fossils at base 15'<br>Limestone, ferruginous, with marine fossils (0' 7") 1<br>} Blackwater (Dingess?) Shale and Limestone (2845' B.) | 16 | 280 | 115 |
| Sandstone, shaly | 2 | 282 | |
| Shale, dark-gray | 5 | 287 | |
| Concealed | 13 | 300 | 20 |
| Sandstone, massive, Lower Gilbert, to Black-River (2870' B.) | 5 | 305 | |

## MEASURED SECTIONS, DRY FORK DISTRICT.

Dry Fork District occupies the southeastern corner of the county, next to Grant and Randolph Counties, its surface geology ranging from the Conemaugh Series of the Pennsylvanian down into the Catskill Series of the Devonian, the principal area of Pennsylvanian sediments being along the Stony River Syncline at the eastern side. Throughout the central portion the lower deposits come to the surface along the Blackwater Anticline, the productive coal measures being entirely absent. The high mountains which prevail generally throughout the district afford an excellent opportunity to secure vertical measurement of the strata.

The following section, measured with aneroid and arranged in descending order, starts at the northern rim of the Green Mountain plateau west of Coal Run and 1.5 miles southwest of Otter Station, and its upper portion extends mainly down the tumultuous gully formed by the run, the strata being almost completely bared. The lower portion, comprising the Mauch Chunk and Greenbrier Series, was mostly measured down the point one-fourth mile west of the run. The section was made along the strike of the rocks and represents true vertical measurement:

### Otter Creek Section, Dry Fork District.

| | Thick-ness. Feet. | Total. Feet. | Inter-val. Feet. |
|---|---|---|---|
| **Pottsville Series—Kanawha Group (350')** | | | |
| Sandstone, massive, cliff, very pebbly, **Homewood, makes plateau** (top, 3220' B.)..... | 65 | 65 | |
| Concealed .............................. | 40 | 105 | |
| Sandstone, massive, pebbly, **Upper Connoquenessing** .......................... | 75 | 180 | |
| Concealed, with shale.................... | 40 | 220 | |
| Shale, dark, sandy, **Quakertown**........... | 14 | 234 | |
| **Coal**, soft ..... 1' 1"<br>Shale, dark ..... 0 8<br>**Coal**, bony .... 0 3<br>(2' 0") **Quakertown (Winifrede?)** (2984' B.) Otter Creek Boom & Lumber Co. Exposure (No. 90 on Map II) | 2 | 236 | 236 |
| Fire clay shale, dark...................... | 3½ | 239½ | |
| **Coal, slaty** (0' 6") (2980' B.).............. | 0½ | 240 | 4 |
| Shale, sandy, dark, with plant fossils and **Lingulae near middle, Winifrede Limestone ?** | 20 | 260 | |
| Sandstone, massive, cliff rock, **Lower Gilbert**. | 68 | 328 | |
| **Coal, medium-soft, (1' 9"), Gilbert** (2890'B.) Otter Creek Boom & Lumber Company Exposure (No. 95 on Map II)............ | 2 | 330 | 90 |
| Fire clay shale and sandy shale........... | 20 | 350 | |
| **Pottsville Series—New River Group (270')** | | | |
| Sandstone, massive, pebbly, cliff, coal spars at base, **Upper and Lower Nuttall**...... | 70 | 420 | |
| Shale, dark, sandy, **Upper Iaeger**.......... | 24 | 444 | |
| **Coal,** soft, **(0' 11"), Hughes Ferry** (2775' B.), Otter Creek Boom & Lumber Company Exposure (No. 98 on Map II)........... | 1 | 445 | 115 |
| Fire clay shale and dark shale, **Sandy Huff**. | 24 | 469 | |
| **Coal**..... 0' 7"<br>Slate, black.. 0 3<br>**Coal**..... 0 4<br>(1' 2") **Castle** (2750' B.) Otter Creek Boom & Lumber Company Exposure (No. 103 on Map II) | 1 | 470 | 25 |
| Fire clay shale and sandy shale.......... | 10 | 480 | |
| Sandstone, massive, **Lower Guyandot**..... | 10 | 490 | |
| Shale, dark, **Hartridge**.................... | 9½ | 499½ | |
| **Coal, (0' 6"), Sewell** (2720' B.), Otter Creek Boom & Lumber Company Exposure (No. 116 on Map II)......................... | 0½ | 500 | 30 |

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| Sandstone, massive, Sharon (Upper Raleigh) | 30 | 530 | |
| Concealed, with sandstone and shale (2600′ B.) | 90 | 620 | 120 |
| **Mauch Chunk Series (640′)** | | | |
| Shale, red | 35 | 655 | |
| Sandstone, massive, Princeton | 15 | 670 | |
| Shale, variegated | 20 | 690 | |
| Shale, red, partly concealed | 400 | 1090 | |
| Sandstone, green, fine-grained | 20 | 1110 | |
| Shale, red, and concealed (1960′ B.) | 150 | 1260 | 640 |
| **Greenbrier Limestone Series (140′)** | | | |
| Limestone, partly concealed, to mouth of Coal Run | 140 | 1400 | |

The following section, measured with aneroid and arranged in descending order, starts at the public road 0.5 mile northeast of Richford and extends southward to Dry Fork at the mouth of Laurel Run, 0.3 mile east of Richford:

### Richford Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet |
|---|---|---|
| Limestone, Greenbrier | ... | .... |
| **Pocono Series (225′)** | | |
| Sandstone, massive, pebby at top, Big Injun | 50 | 50 |
| Concealed | 150 | 200 |
| Sandstone | 5 | 205 |
| Coal streak (0′ 1″) (2095′ B.) | ... | 205 |
| Shale, gray, and concealed | 5 | 210 |
| Sandstone, massive, Berea Sand? (2075′ B.) | 15 | 225 |
| **Catskill Series (215′)** | | |
| Shale, red | 50 | 275 |
| Sandstone, massive, Fifty-foot Sand? | 80 | 355 |
| Shale, red | 25 | 380 |
| Sandstone, massive, with shaly streaks and coal spars, Thirty-foot Sand? | 45 | 425 |
| Concealed and sandstone to Dry Fork at mouth of Laurel Run (1860′ B.) | 15 | 440 |

The following section, measured with aneroid and arranged in descending order, starts on the head of Elklick Run and extends southward and southwestward, down the run, to its mouth at Elklick Station. Owing to the southward rise of the rocks intervals are somewhat less than true vertical measurement would show:

## Elklick Section, Dry Fork District.

| | Thick-ness. Feet. | Total. Feet. | Inter-val. Feet. |
|---|---|---|---|
| Red shale, base of **Mauch Chunk Series** (2590′ B.) | ... | .... | |
| **Greenbrier Limestone Series (285′)** | | | |
| Limestone, shaly | 10 | 10 | |
| Shale, limy | 20 | 30 | |
| Limestone | 20 | 50 | |
| Shale, limy | 15 | 65 | |
| Limestone, gray, shaly | 30 | 95 | |
| Shale, red and limy | 15 | 110 | |
| Limestone, hard, gray | 20 | 130 | |
| Shale, red | 50 | 180 | |
| Limestone | 10 | 190 | |
| Shale, red | 20 | 210 | |
| Limestone | 5 | 215 | |
| Shale, red | 10 | 225 | |
| Limestone, hard, gray, cavernous (2305′ B.) | 60 | 285 | 285 |
| **Pocono Sandstone Series (85′)** | | | |
| Sandstone, massive, gray, **Big Injun** | 25 | 310 | |
| Shale, gray, sandy, with sandstone streaks | 20 | 330 | 45 |
| Sandstone, massive, conglomeratic, **Berea Sand?** (2220′ B.) | 40 | 370 | |
| **Catskill Series (320′)** | | | |
| Sandstone, shaly, **Gantz** | 45 | 415 | |
| Shale, red | 75 | 490 | 160 |
| Sandstone, massive, reddish-brown, with streaks of shale, **Fifty-foot and Thirty-foot Sands?** | 110 | 600 | |
| Shale, red | 15 | 615 | |
| Sandstone, massive, **Gordon Stray Sand?**, to Dry Fork River (1900′ B.) | 75 | 690 | |

The following section, measured with aneroid and arranged in descending order, starts at the point where the Middle Mountain road crosses the Tucker-Randolph County Line 1 mile westward from Jenningston, and extends eastward to Dry Fork at the foot of the mountain road one-half mile below the town. It apparently represents almost the full thickness of the Catskill Series but fails to reach either the Pocono or Chemung contact:

## Jenningston Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| **Catskill Series (800')** | | |
| Sandstone, shaly, and shale, red | 65 | 65 |
| Sandstone, red, flaggy | 25 | 90 |
| Shale, red | 25 | 115 |
| Sandstone, red, flaggy | 30 | 145 |
| Shale, red, with red, flaggy sandstone | 175 | 320 |
| Sandstone, reddish-brown | 105 | 425 |
| Shale, red, with sandstone | 120 | 545 |
| Sandstone, massive, reddish-brown | 150 | 695 |
| Concealed and red shale | 30 | 725 |
| Sandstone, massive | 60 | 785 |
| Concealed to Dry Fork | 15 | 800 |

The following section, measured with aneroid and arranged in descending order, starts at the road fork 1.5 miles northeast of Dry Fork village and extends southwestward down the highway to Red Creek at Dry Fork village:

## Dry Fork Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet | Interval. Feet |
|---|---|---|---|
| Limestone, **Greenbrier** | ... | .... | |
| **Pocono Series (185')** | | | |
| Sandstone, massive, gray, **Big Injun** | 55 | 55 | |
| Shale, sandy, partly concealed | 78 | 133 | |
| Fire clay and dark shale | 2 | 135 | |
| Sandstone, shaly, **Berea Sand?** | 25 | 160 | |
| Shale, gray, sandy (2560' B.) | 25 | 185 | 185 |
| **Catskill Series (380')** | | | |
| Shale, red, partly concealed | 65 | 250 | |
| Sandstone, **Fifty-foot Sand?** | 10 | 260 | |
| Shale, red | 150 | 410 | |
| Sandstone, massive, with shaly streaks, **Gordon Stray Sand?** | 85 | 495 | 310 |
| Shale, red | 20 | 515 | |
| Sandstone, shaly | 10 | 525 | |
| Shale, red | 10 | 535 | |
| Sandstone, reddish-brown, shaly, **Gordon?** to Red Creek at Dry Fork village (2180' B.) | 30 | 565 | |

The following section, measured with aneroid and arranged in descending order, starts at Chimney Rock on the southern extremity of Canaan Mountain, and extends southwestward to Big Run at Flanagan Hill (Red Creek P. O.). Being nearly on the strike of the rocks it represents approximately true vertical measurement of 1,545 feet of strata:

## Flanagan Hill Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| **Pottsville Series—New River Group (150′)** | | |
| Sandstone, massive, "Chimney Rock", Upper Raleigh (Sharon?) | 65 | 65 |
| Concealed by debris, sandy soil (3950′ B.) | 85 | 150 |
| **Mauch Chunk Series (985′)** | | |
| Shale, red | 175 | 325 |
| Sandstone, flaggy | 15 | 340 |
| Shale, red | 180 | 520 |
| Sandstone, reddish-green, fine-grained, flaggy | 55 | 575 |
| Shale, red | 150 | 725 |
| Sandstone, reddish, fine-grained, flaggy | 40 | 765 |
| Shale, red, partly concealed | 80 | 845 |
| Sandstone, flaggy | 25 | 870 |
| Shale, red, partly concealed | 105 | 975 |
| Sandstone, massive, reddish-gray | 35 | 1010 |
| Concealed | 30 | 1040 |
| Limestone, **Hinton** | 25 | 1065 |
| Concealed and flaggy sandstone, **Webster Springs** (2965′ B.) | 70 | 1135 |
| **Greenbrier Limestone Series (255′)** | | |
| Concealed | 10 | 1145 |
| Limestone | 55 | 1200 |
| Concealed | 50 | 1250 |
| Limestone, gray | 20 | 1270 |
| Concealed | 50 | 1320 |
| Limestone, gray | 15 | 1335 |
| Concealed | 15 | 1350 |
| Limestone, gray (2710′ B.) | 40 | 1390 |
| **Pocono Series (155′)** | | |
| Sandstone, massive, gray, partly concealed to Big Run at Flanagan Hill (Red Creek P. O.) | 155 | 1545 |

The following section, measured with aneroid and arranged in descending order, starts at the top of Bald Knob on Cabin Mountain and extends westward to the point where Mill Run crosses the public highway one-half mile south of Buena. Owing to the rapid westward rise of the rocks intervals are much less than true vertical measurement would show, the total rise along the line of traverse being more than 300 feet:

### Buena Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| **Pottsville Series—New River Group (225')** | | | |
| Sandstone, capping Bald Knob, Nuttall.... | 35 | 35 | |
| Concealed ................................ | 15 | 50 | |
| Sandstone, massive, cliff, Guyandot and Lower Guyandot........................ | 55 | 105 | 105 |
| Concealed and sandy soil (4150' B.)...... | 120 | 225 | |
| **Mauch Chunk Series (700')** | | | |
| Shale, red, partly concealed (3450' B.)..... | 700 | 925 | 820 |
| **Greenbrier Limestone Series (135')** | | | |
| Concealed, with limy soil, to public road at Mill Run.................................. | 135 | 1060 | |

The following section, measured with aneroid and arranged in descending order, starts at the top of Wiess Knob, the highest topographic point in the county, at the southern extremity of Cabin Mountain, and extends southward to Red Creek 0.8 mile below Laneville. Being almost on the strike of the rocks it represents almost true vertical measurement of 1,990 feet of strata. Owing to the great amount of talus and debris below the cliffs no coals were exposed:

### Laneville Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| **Allegheny Series (150')** | | |
| Sandstone, massive, capping Wiess Knob, Upper Freeport......................... | 35 | 35 |
| Concealed in steep slope, with sandstone... | 115 | 150 |
| **Pottsville Series—Kanawha Group (180')** | | |
| Steep bluff, with sandstone, Homewood.... | 25 | 175 |
| Concealed in slope....................... | 30 | 205 |
| Sandstone, massive, Upper Connoquenessing | 105 | 310 |
| Concealed in bench...................... | 20 | 330 |
| **Pottsville Series—New River Group (345')** | | |
| Sandstone, massive, cliff, Upper and Lower Nuttall ................................ | 80 | 410 |
| Concealed ................................ | 20 | 430 |
| Sandstone and concealed, in steep slope... | 220 | 650 |
| Sandstone, massive pebbly, Upper Raleigh (Sharon?) (3745'B.)...................... | 25 | 675 |
| **Mauch Chunk Series (835')** | | |
| Shale, red, partly concealed.............. | 255 | 930 |
| Sandstone, flaggy......................... | 10 | 940 |
| Shale, red, partly concealed (2910' B.)..... | 570 | 1510 |
| **Greenbrier Limestone Series (430')** | | |
| Limestone, hard.......................... | 25 | 1535 |
| Concealed ................................ | 40 | 1575 |
| Limestone, partly concealed............... | 110 | 1685 |

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Sandstone | 45 | 1730 |
| Limestone, hard, gray, partly concealed (2480′ B.) | 210 | 1940 |
| **Pocono Series (50′)** | | |
| Sandstone, pebbly, **Big Injun**, to Red Creek (2430′ B.) | 50 | 1990 |

The following section, measured with aneroid and arranged in descending order, starts at the "Big Rocks" 2.1 miles northeast of Laneville, and extends southward down Little Stonecoal Run to its intersection with Red Creek 1.5 miles eastward from Laneville. Being on the strike of the rocks it represents approximately true vertical measurement, no coals being exposed above the Sewell (Sharon?) owing to the great amount of debris:

### Little Stonecoal Run of Red Creek Section, Dry Fork District.

| | Thickness. Feet. | Total. Feet | Interval. Feet. |
|---|---|---|---|
| **Allegheny Series (150′)** | | | |
| Sandstone, massive, very pebbly, forms cliff known as "Big Rocks" on top of mountain, **Upper Freeport** (top, 3860′ B.) | 35 | 35 | |
| Concealed | 25 | 60 | |
| Sandstone, massive, **Lower Freeport** | 50 | 110 | |
| Concealed | 40 | 150 | 150 |
| **Pottsville Series—Kanawha Group (320′)** | | | |
| Sandstone, pebbly, partly concealed, **Homewood** | 75 | 225 | |
| Concealed | 185 | 410 | |
| Shale, sandy and sandstone | 15 | 425 | |
| Shale, dark, sandy | 35 | 460 | |
| Sandstone | 5 | 465 | |
| Shale, dark, with plant fossils | 5 | 470 | 320 |
| **Pottsville Series—New River Group (270′)** | | | |
| Sandstone, massive, **Upper and Lower Nuttall** | 45 | 515 | |
| Shale, dark, sandy | 10 | 525 | |
| Sandstone, massive, **Guyandot** | 25 | 550 | |
| Concealed and shale | 18 | 568 | |
| Sandstone, shaly, **Lower Guyandot** | 10 | 578 | |
| Shale, black, with plant fossils, **Hartridge** | 20 | 598 | |
| **Coal, soft** 0′ 4″; Slate, dark 0 4; **Coal** 0 2½; Slate, dark, bony 0 2½; **Coal, soft** 0 8 — (1′ 9″) **Sewell (Sharon?)** (3260′ B.) Robert Bridges Heirs Prospect (No. 124 on Map II) | 2 | 600 | 130 |

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| Shale, dark, partly concealed............ | 40 | 640 | |
| Sandstone, massive, cliff rock, with Sigillaria and Cordaites (very numerous), Upper Raleigh (Sharon?) (3120′ B.)...... | 100 | 740 | |
| Mauch Chunk Series (430′) | | | |
| Concealed .............................. | 50 | 790 | |
| Sandstone, massive, greenish............ | 15 | 805 | |
| Shale, red and green.................... | 80 | 885 | 285 |
| Sandstone, massive, with large angular quartz pebbles, 1″ to 2″ in diameter, Princeton (2890′ B.).................... | 85 | 970 | |
| Shale, red, partly concealed............... | 20 | 990 | |
| Sandstone, green......................... | 5 | 995 | |
| Concealed .............................. | 75 | 1070 | |
| Sandstone, massive, pebbly at top......... | 40 | 1110 | |
| Concealed, with red shale, to Red Creek at mouth of Little Stonecoal Run (2690′ B.) | 60 | 1170 | |

In the following section, arranged in descending order, the upper portion starts at an elevation of 3715′ B., with the record of the Robert Bridges Estate No. 2 Coal Test Boring (No. 81 on Map II), located just west of Stonecoal Run 3.3 miles northeast of Laneville. The portion below 190 feet was measured with aneroid down the steep gully of Stonecoal Run to its mouth, starting at the stratigraphic level of the base of the boring. Being on the strike of the rocks the section represents approximately true vertical measurement:

### Stonecoal Run of Red Creek Section, Dry Fork District.

| | Thickness. Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| Conemaugh Series (79′ 1″) | | | | | | |
| Clay, sand, and gravel................ | 20 | 0 | 20 | 0 | | |
| Sandstone, rotten, Upper Mahoning... | 2 | 0 | 22 | 0 | | |
| Shale, tough, blue, with soft sticky partings ......................... | 44 | 0 | 66 | 0 | | |
| Sandstone, Lower Mahoning.......... | 12 | 9 | 78 | 9 | | |
| Shale, Uffington...................... | 0 | 4 | 79 | 1 | | |
| Allegheny Series (110′ 11″) | | | | | | |
| Upper Freeport (Davis): Coal ........ 0′ 3″; Shale ....... 0 5; Coal ........ 3 8; Shale ....... 0 10; Coal ........ 3 1 ....... | 8 | 3 | 87 | 4 | 87 | 4 |
| Shale, with coal partings.............. | 1 | 8 | 89 | 0 | | |
| Shale, blue........................... | 9 | 0 | 98 | 0 | | |
| Fire clay............................ | 6 | 2 | 104 | 2 | | |
| Shale, sandy........................ | 7 | 1 | 111 | 3 | | |

| | Thickness Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| Shale, dark | 0 | 10 | 112 | 1 | | |
| Coal ........ 0′ 4″ | | | | | | |
| Shale, dark.. 0 2 } Lower Freeport.. | 1 | 5 | 113 | 6 | 26 | 2 |
| Coal .........0 11 | | | | | | |
| Shale, dark | 1 | 0 | 114 | 6 | | |
| Shale, light. sandy | 7 | 6 | 122 | 0 | | |
| Sandstone, slightly mixed with shale.. 20′ 0″ | | | | | | |
| Sandstone, hard...... 7 0 } Lower Freeport | 27 | 0 | 149 | 0 | | |
| Shale, sandy | 25 | 0 | 174 | 0 | | |
| Shale, dark | 3 | 0 | 177 | 0 | | |
| Shale, sandy | 2 | 0 | 179 | 0 | | |
| Shale, dark | 0 | 9 | 179 | 9 | | |
| Coal, slaty...........0′ 6″ | | | | | | |
| Coal, clean......... 0 3 } Upper Kittanning.. | 2 | 6 | 182 | 3 | 68 | 9 |
| Coal .............. 1 9 | | | | | | |
| Shale, light | 0 | 6 | 182 | 9 | | |
| Shale, sandy, to bottom | 7 | 3 | 190 | 0 | | |
| (Continued with surface measurements down Stonecoal Run): | | | | | | |
| **Pottsville Series—Kanawha Group (155′)** | | | | | | |
| Sandstone, massive, great cliff, very pebbly, Homewood (top, 3590′ B.) | 40 | 0 | 230 | 0 | | |
| Concealed | 115 | 0 | 345 | 0 | | |
| **Pottsville Series—New River Group (335′)** | | | | | | |
| Sandstone, great cliff, Upper and Lower Nuttall | 105 | 0 | 450 | 0 | | |
| Concealed | 45 | 0 | 495 | 0 | | |
| Sandstone, massive, medium-grained, Lower Guyandot | 40 | 0 | 535 | 0 | | |
| Shale, black, fissile, with marine fauna, pelecypods and lingular brachopods, Hartridge | 18 | 4 | 553 | 4 | | |
| Coal, soft, Sewell (Sharon?), Robert Bridges Heirs Prospect (No. 125 on Map II) (3225′ B.) | 1 | 8 | 555 | 0 | 373 | 9 |
| Shale, sandy, dark, partly concealed | 35 | 2 | 590 | 2 | | |
| Sandstone, massive, Welch | 25 | 0 | 615 | 2 | | |
| Slate, black, streak, Welch Coal horizon | .. | .. | 615 | 2 | | |
| Sandstone, massive, with plant fossils at base, Upper Raleigh (Sharon?) | 45 | 0 | 660 | 2 | | |
| Coal, good. 0′ 4″ } Fire Creek (3115′ B.) | | | | | | |
| Slate, bony 0 5 } Robert Bridges Heirs | | | | | | |
| Coal, bony. 2 6 } Prospect (No. 135... | 4 | 10 | 665 | 0 | 110 | 0 |
| Slate, bony 0 4 } on Map II) | | | | | | |
| Coal, bony. 1 3 | | | | | | |
| Fire clay shale, sandy (3100′ B.) | 15 | 0 | 680 | 0 | | |
| **Mauch Chunk Series (300′)** | | | | | | |
| Shale, red | 15 | 0 | 695 | 0 | | |
| Sandstone, massive | 30 | 0 | 725 | 0 | | |
| Shale, green and red | 60 | 0 | 785 | 0 | | |
| Concealed | 15 | 0 | 800 | 0 | | |
| Sandstone, green, flaggy | 30 | 0 | 830 | 0 | | |
| Shale, greenish-gray | 25 | 0 | 855 | 0 | 190 | 0 |

| | Thickness. | | Total. | | Interval. | |
|---|---|---|---|---|---|---|
| | Ft. | In. | Ft. | In. | Ft. | In. |
| Sandstone, massive, large quartz pebbles 1" to 1½" diameter, Princeton.. | 15 | 0 | 870 | 0 | | |
| Concealed and red shale to mouth of Stonecoal Run (2800' B.)............ | 110 | 0 | 980 | 0 | | |

In the following section, arranged in descending order, the upper portion is the record of the Robert Bridges Estate No. 4 Coal Test Boring (No. 84 on Map II), located one-half mile west of the forks of Red Creek and 4.5 miles northeast of Laneville, and having a surface elevation of 3805' B. The lower portion, below 84 feet was measured with aneroid, starting at the stratigraphic level of the base of the boring and extending eastward to the Upper Kittanning Coal which outcrops on Right Fork, 0.3 mile above the forks. From this horizon the section continues down the creek to the mouth of Stonecoal Run, exposures being good owing to the turbulent fall and numerous cataracts. The measured portion of the section approximately follows the axis of the Stony River Syncline, affording nearly true vertical measurement:

### Red Creek Section, Dry Fork District.

| | Thickness. | | Total. | | Interval. | |
|---|---|---|---|---|---|---|
| **Conemaugh and Allegheny Series (275')** | Ft. | In. | Ft. | In. | Ft. | In. |
| Clay ................................ | 7 | 0 | 7 | 0 | | |
| Boulders and rotten sandstone........ | 3 | 7 | 10 | 7 | | |
| Shale, light.......................... | 11 | 5 | 22 | 0 | | |
| Shale, sandy......................... | 9 | 6 | 31 | 6 | | |
| Sandstone ........... 8' 6" } Buffalo.<br>Sandstone, broken.... 18 0 } | 26 | 6 | 58 | 0 | | |
| Shale, sandy.......................... | 4 | 0 | 62 | 0 | | |
| Shale, dark, Brush Creek.............. | 8 | 0 | 70 | 0 | | |
| Coal, Brush Creek (3733' B.).......... | 2 | 4 | 72 | 4 | 72 | 4 |
| Shale, light.......................... | 7 | 8 | 80 | 0 | | |
| Shale, dark........................... | 1 | 3 | 81 | 3 | | |
| Coal ................. 1' 3" } Mahoning<br>Coal and shale, mixed. 0 6 } (3722' B.) | 1 | 9 | 83 | 0 | 10 | 8 |
| Shale, light.......................... | 0 | 6 | 83 | 6 | | |
| Shale, sandy, to bottom of boring...... | 0 | 6 | 84 | 0 | | |
| (Section continued with surface measurements down Red Creek): | | | | | | |
| Concealed ............................ | 165 | 0 | 249 | 0 | | |
| Shale, dark, sandy.................... | 10 | 0 | 259 | 0 | | |
| Sandstone, shaly, Lower Freeport..... | 5 | 0 | 264 | 0 | | |
| Coal, soft.... 0' 10" } Upper Kittanning<br>Slate, black, hard 0 2 } (3540' B.) Robert Bridges Heirs (No. 74 on Map II) | 1 | 0 | 265 | 0 | 182 | 0 |
| Concealed ............................ | 10 | 0 | 275 | 0 | | |
| **Pottsville Series—Kanawha Group (215')** | | | | | | |

| | Thickness. Ft. | In. | Total. Ft. | In. | Interval. Ft. | In. |
|---|---|---|---|---|---|---|
| Sandstone, massive, pebbly, makes 20-foot cataract at base, Homewood.... | 85 | 0 | 360 | 0 | | |
| Slate, black, coaly, Upper Mercer Coal horizon (3440′ B.).................. | 5 | 0 | 365 | 0 | 100 | 0 |
| Sandstone, massive, makes falls....... | 25 | 0 | 390 | 0 | | |
| Shale, dark, sandy, Kanawha Black Flint horizon...................... | 15 | 0 | 405 | 0 | | |
| Sandstone, massive, Upper Connoquenessing .............................. | 55 | 0 | 460 | 0 | | |
| Concealed .......................... | 15 | 0 | 475 | 0 | | |
| Sandstone, shaly.................... | 2 | 0 | 477 | 0 | | |
| Shale, black, peacock-colored, Quakertown ............................ | 6 | 10 | 483 | 10 | | |
| Coal, soft, good 0′ 9″; Coal, bony. 0 5 } Quakertown (Winifrede?) (3320′ B.) Robert Bridges Heirs Exposure (No. 91 on Map II) | 1 | 2 | 485 | 0 | 120 | 0 |
| Shale, dark, sandy, with plant fossils, Winifrede Limestone horizon....... | 5 | 0 | 490 | 0 | | |
| **Pottsville Series—New River Group (290′)** | | | | | | |
| Sandstone, massive, Nuttall........... | 50 | 0 | 540 | 0 | | |
| Concealed .......................... | 15 | 0 | 555 | 0 | | |
| Shale, dark, sandy, Upper Iaeger...... | 9 | 6 | 564 | 6 | | |
| Coal, Hughes Ferry, Robert Bridges Heirs Exposure (No. 102 on Map II) (3240′ B.)........................... | 0 | 6 | 565 | 0 | 80 | 0 |
| Shale, sandy, dark, with Sigillaria and iron ore, Lower Iaeger.............. | 35 | 0 | 600 | 0 | | |
| Concealed .......................... | 5 | 0 | 605 | 0 | | |
| Sandstone, massive, Lower Guyandot.. | 15 | 0 | 620 | 0 | | |
| Shale, sandy, with iron ore, Hartridge.. | 9 | 4 | 629 | 4 | | |
| Coal .........0′ 8″; Shale, sandy, dark. 8 9; Coal, slaty, 0′ 2″ to 1 3 } Sewell (Sharon?) (3165′ B.) Robert Bridges Heirs Exposure (No. 126 on Map II) | 10 | 8 | 640 | 0 | 75 | 0 |
| Shale, sandy........................ | 2 | 6 | 642 | 6 | | |
| Sandstone, massive, Welch............ | 35 | 0 | 677 | 6 | | |
| Shale, dark.......................... | 1 | 0 | 678 | 6 | | |
| Coal, slaty, Welch, (3125′ B.), Robert Bridges Heirs Exposure (No. 129 on Map II)............................ | 1 | 6 | 680 | 0 | 40 | 0 |
| Shale, dark. and concealed............ | 15 | 0 | 695 | 0 | | |
| Sandstone, massive, Upper Raleigh (Sharon?) ......................... | 55 | 0 | 750 | 0 | 70 | 0 |
| Concealed .......................... | 15 | 0 | 765 | 0 | | |
| Sandstone, massive, Pineville (3025′ B.) | 15 | 0 | 780 | 0 | | |
| **Mauch Chunk Series (225′)** | | | | | | |
| Shale, greenish...................... | 5 | 0 | 785 | 0 | | |
| Concealed .......................... | 5 | 0 | 790 | 0 | 40 | 0 |
| Sandstone, massive, pebbly, Princeton (2970′ B.)........................... | 45 | 0 | 835 | 0 | | |
| Shale, red, with sandstones and concealed, to mouth of Stonecoal Run (2800′ B.)........................... | 170 | 0 | 1005 | 0 | | |

PLATE VI.—View of North Fork of Blackwater River below Douglass showing cataract over basal portion of Upper Connoquenessing Sandstone. Upper cliff at right is Homewood. Topography of Conemaugh, Allegheny, and Pottsville Series.

## SUMMARY OF MEASURED SECTIONS.

For convenient reference the thickness of the stratified rocks of Tucker, as determined by the measured sections in this Chapter, is compiled in the following table, showing not only the thicknesses of the various series but also the totals for the Pennsylvanian, Mississippian, and Devonian Periods down to the lowest depths to which drillings have penetrated them. A line of dots under a series indicates that it was not exposed, or in some cases not examined, where the section was measured. A question mark indicates that the series was present but could not be differentiated from the one overlying or the one below it. A plus mark indicates that only a portion of the full series is included in the section. In some cases a section shows a thickness of a series either too great or too small, owing to the dip of the measures where it was made, but as far as possible such places were avoided, care being taken to measure the sections on the strike. Several important sections, however, were measured on steeply dipping rocks but were reduced to true vertical measurement and so published. An explanation accompanies each section, where published in the text, detailing the conditions under which it was made:

# Table Showing Thickness of Stratified Rocks in Tucker County.

| Place Measured. | Pennsylvanian. | | | | | | Mississippian. | | | | Devonian. | | | | | | | | Total Section |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Monongahela. | Conemaugh. | Allegheny. | Pottsville. Kanawha. | Pottsville. New River. | Total. | Mauch Chunk. | Greenbrier. | Pocono. | Total. | Catskill. | Chemung. | Portage. | Genesee. | Hamilton | Marcellus (Romney) | Corniferous | Oriskany | Total. | |
| Auvil | | | | | | | | | | | | 71+ | | | | | | | 71+ | 71 |
| Backbone Mountain | | | 126+ | 325 | 260 | 711+ | 790 | 235 | 84+ | 1109+ | | | | | | | | | | 1820 |
| Blackwater Falls | | | | 174+ | | 174+ | | | | | | | | | | | | | | 174 |
| Buena | | | | | 225+ | 225+ | 700 | 135+ | | 835+ | | | | | | | | | | 1060 |
| Bull Run | | | | | | | | | | | | 35+ | | | | | | | 35+ | 35 |
| Clay Run | | | | | | | | | | | | 322.4+ | | | | | | | 322.4+ | 322.4 |
| Davis | | | | 305+ | | 305+ | | | | | | | | | | | | | | 305 |
| Douglas | | 285+ | 153 | 310 | 210 | 958+ | 25+ | | | 25+ | | | | | | | | | | 983 |
| Dry Fork | | | | | | | | | 185 | 185+ | 380+ | | | | | | | | 380+ | 565 |
| Elklick | | | | | | | | 285 | 85 | 370+ | 320+ | | | | | | | | 320+ | 690 |
| Fairfax | 56+ | 838.5 | 22.9+ | | | 917.4+ | | | | | | | | | | | | | | 917.5 |
| Flanagan Hill | | | | | 150+ | 150+ | 985 | 255 | 155+ | 1395+ | | | | | | | | | | 1545 |
| Hambleton | | | | | | | | | | | | 598.8+ | | | | | | | 598.8+ | 598.8+ |
| Hardesty | | | | | | | | | | | | 62+ | | | | | | | 62+ | 62 |
| Hendricks | | | | 388 | 139 | 527+ | 540 | 290 | 114 | 944 | 51+ | | | | | | | | 51+ | 1522 |
| Jenningston | | | | | | | | | | | 800+ | | | | | | | | 800+ | 800 |
| Laneville | | | 150+ | 180 | 345 | 675+ | 835 | 430 | 50+ | 1315+ | | | | | | | | | | 1990 |
| Laurel Run | | | 140+ | ? | ? | 700+ | 670 | 225+ | | 895+ | | | | | | | | | | 1595 |
| Limestone Mountain | | | | 96+ | | 96+ | 305 | 165 | 250 | 725 | 250+ | | | | | | | | 250+ | 1066 |
| Little Stonecoal Run | | | 150+ | 320 | 270 | 740+ | 430+ | | | 430+ | | | | | | | | | | 1170 |
| Otter Creek | | | | 350 | 270 | 620+ | 640 | 140+ | | 780+ | | | | | | | | | | 1400 |
| Parsons | | | | 255+ | 275 | 530+ | 585 | 255 | 125 | 965 | 722 | 2890 | 1460 | 170 | 1000 | 695 | 155 | 270 | 7362+ | 8857 |
| Pettit | | | | | | | | | | | | 27.9+ | | | | | | | 27.9+ | 27.9 |
| Red Creek | | ? | ? | 215 | 290 | 780+ | 225+ | | | 225+ | | | | | | | | | | 1005 |
| Redhill Church | | | | | | | | | | | | 210.8+ | | | | | | | 210.8+ | 210.8 |
| Richford | | | | | | | | | 225+ | 225+ | 215+ | | | | | | | | 215+ | 440 |
| Right Fork of Bull Run | | | | | | | | | | | | 30+ | | | | | | | 30+ | 30 |
| Stonecoal Run | | 79.1+ | 110.9 | 155 | 335 | 680+ | 300+ | | | 300+ | | | | | | | | | | 980 |
| Texas | | | | | | | | | 275.8 | 275.8+ | 12.7+ | | | | | | | | 12.7+ | 288.5 |
| Thomas | | 431.1+ | 15.9+ | | | 447+ | | | | | | | | | | | | | | 447 |

# CHAPTER V.

## STRATIGRAPHY--MONONGAHELA AND CONEMAUGH SERIES.

### GENERAL ACCOUNT, MONONGAHELA SERIES.

The Monongahela Series of the Pennsylvanian Period, is represented in Tucker only by one or two isolated deposits in the top of Fairfax Knob and Roger Camp Hill near the common corner of the county with Grant County and Garrett County (Maryland). In this locality, where 56 feet of the series remain, it consists of gray sandstone, sandy and argillaceous shales, and coal, of which latter there is one large bed (the Pittsburgh) with a "rider" coming a few feet above it No limestones are visible in the knob above the Pittsburgh Coal, but as this portion of the series is only imperfectly exposed, it is possible that a thin limestone, representing the Redstone, may be present.

### DESCRIPTION OF MEMBERS, MONONGAHELA SERIES.

#### UPPER PITTSBURGH SANDSTONE.

The **Upper Pittsburgh Sandstone** is the most recent stratum of the Monongahela Series now remaining in the top of Fairfax Knob. As detailed in the section for Fairfax, page 130, it is not well exposed, but is apparently 36 feet or less in thickness, gray, coarse-grained, and friable, as evidenced by boulders and fragmentary outcrop. Its presence in the top of the knob is entirely responsible for the preservation of the few acres of Pittsburgh Coal that still remain in the locality. The historic Fairfax Stone, planted by George Washington just northwest of the top of the knob at the extreme southwestern corner of Maryland, was apparently a boulder from this ledge. The top of this old monument is now flush with the soil, its upper portion having been entirely removed, presumably by the joint action of the weather and the souvenir hunters. A new concrete monument, standing alongside the old stone, marks its position.

#### PITTSBURGH "RIDER" COAL.

In the top of Fairfax Knob a stratum of coal and shale. 2′ 4″ thick, occurs between the Upper Pittsburgh Sandstone, and the main Pittsburgh Coal, being separated from the latter by 5′ 3″ of gray shale. This bed may be termed the **Pittsburgh "Rider" Coal** to distinguish it from the parent seam, from which it is presumably an offshoot, due to the eastward thickening of the Pittsburgh. Its character is revealed in the section for Fairfax Knob, page 130, and its position is indicated by **Exposure No. 1** on Map II, which is its only outcrop in the area under study.

#### PITTSBURGH COAL.

The **Pittsburgh Coal** is the basal member of the Monongahela Series. In the area under study it occurs only in the vicinity of Fairfax, where its horizon covers only a few acres in two knobs, mostly in Grant County. As detailed in the section for Fairfax, page 130, it is 12′ 5″ thick, having a main bench of coal 9′ 9″ thick, with gray shale partings above and below, followed by thin benches of coal at the top and bottom. Its economic significance and character will be discussed more fully in Chapter XIII, under the subject of "Commercial Coal."

### GENERAL ACCOUNT AND SECTION, CONEMAUGH SERIES.

The Conemaugh Series of the Pennsylvanian Period comprises only a small portion of the surface rocks of Tucker. As shown on Map II it is confined to the northeastern portion of the county, being present in considerable area along the North

Potomac Syncline north of the mouth of North Fork of Blackwater River and extending eastward in a narrow strip to the northeastern corner of the county. Along the same syncline south of the main Blackwater River it is present only in certain high summits of Canaan and Green Mountains. In the southeastern corner of the county its lower members comprise a portion of the surface rocks along the Stony River Syncline.

The entire series is present only in the vicinity of Fairfax Knob, near the corner of Tucker, Grant, and Garrett Counties. In this region, where its full thickness is 838 feet, and elsewhere, it consists of heavy, gray or brown sandstone beds. sometimes pebbly, with intervening beds of gray, brown, argillaceous or red shales, the latter color greatly predominating in the upper portion, and it contains several persistent coal beds of which one, the Bakerstown (Thomas) is a valuable commercial deposit and has been mined extensively along the North Potomac Syncline. Two other beds, coming near the top of the series, are of minable thickness in Fairfax Knob but their areal extent is insignificant. In addition to the various types of strata mentioned above, the series contains a number of thin limestones or limy shale beds, two of which contain marine fossils, and others of which have fresh or brackish-water remains. Lithologically the series contains approximately 29.8 per cent. of sandstone, 64.6 per cent. of shale or fire clay, 3.6 per cent. of coal, and 2.0 per cent. of impure and siliceous limestone.

The following general section compiled from the measured sections published in Chapter IV, as well as from numerous other detailed observations and arranged in descending order, shows the Conemaugh Series for Tucker County:

### General Section of the Conemaugh Series for Tucker County.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Coal, Pittsburgh, basal member of Monongahela Series | ... | .... |
| Fire clay and shale | 5 | 5 |
| Limestone, Fairfax | 2 | 7 |
| Shale | 3 | 10 |
| Coal, Morantown, 4' to | 5 | 15 |
| Concealed, containing shales | 35 | 50 |
| Sandstone, Lower Pittsburgh, gray, 10' to | 20 | 70 |

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Shale, dark, horizon of Upper Pittsburgh Limestone | 4 | 74 |
| Coal, Little Pittsburgh, multiple-bedded | 6 | 80 |
| Concealed and sandy shales, horizon of Lower Pittsburgh Limestone and Connellsville Sandstone | 30 | 110 |
| Shales, sandy and dark, may contain Franklin "Rider" Coal of Maryland | 8½ | 118½ |
| Coal, Little Clarksburg (Franklin (?) of Maryland), double-bedded | 1½ | 120 |
| Shale, gray, and concealed, horizon of Lower Connellsville (Hoffman of Maryland) Sandstone | 24 | 144 |
| Coal, Normantown (Upper Hoffman of Maryland), | 1 | 145 |
| Shale, dark, sandy | 23 | 168 |
| Coal, Middle Hoffman, double-bedded | 2 | 170 |
| Shale, gray, limy | 8 | 178 |
| Limestone, Hoffman, dark, siliceous and carbonaceous, with fresh-water fossils | 2 | 180 |
| Shale, dark, sandy, and concealed, horizon of Lower Hoffman Coal, Clarysville Sandstone and Upper and Lower Clarysville Coals of Maryland | 70 | 250 |
| Sandstone, Morgantown? | 30 | 280 |
| Shale, variegated, horizon of Wellersburg "Rider" Coal, Wellersburg Coal, and Barton "Rider" Coal of Maryland | 109 | 389 |
| Barton Sandstone, lenticular, 0′ to | 20 | 409 |
| Coal, Elk Lick, (Barton, "Four-foot" of Maryland)? | 1 | 410 |
| Shales, variegated, Birmingham, horizon of Elk Lick, Limestone, (Barton of Maryland) and West Milford Coal, 20′ to | 50 | 460 |
| Sandstone, Upper Grafton (of Maryland), 10′ to | 20 | 480 |
| Shale, variegated, horizon of Federal Hill Coal (of Maryland) | 8 | 488 |
| Sandstone, massive, Grafton | 20 | 508 |
| Shale, Ames, dark-green, with marine fossils (sometimes split into two benches by Harlem "Rider" Coal farther east in Maryland) | 10 | 518 |
| Coal, Harlem, 1′ to | 2 | 520 |
| Shale, variegated | 10 | 530 |
| Limestone, Ewing 0′ to | 5 | 535 |
| Shale, red and variegated, Pittsburgh | 30 | 565 |
| Sandstone, massive, Jane Lew | 20 | 585 |
| Shale, red and variegated, Pittsburgh | 27 | 612 |
| Sandstone, massive, Saltsburg | 20 | 632 |
| Shale, sandy | 10 | 642 |
| Coal, Bakerstown (Thomas), 3′ to | 8 | 650 |
| Limestone, lenticular, Albright, 0′ to | 2 | 652 |
| Shale, sandy or red | 15 | 667 |

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Limestone, lenticular, siliceous, **Pine Creek.** (**Cambridge** of Maryland Survey), normally carrying marine fossils; none found in Tucker County, 0′ to | 3 | 670 |
| Shale, red, **Meyersdale**, 10′ to | 5 | 675 |
| Sandstone, **Buffalo**, massive, often conglomeratic | 30 | 705 |
| Shale and Limestone, **Brush Creek**, with marine fossils | 8 | 713 |
| **Coal, Brush Creek**, 1′ to | 2 | 715 |
| Fire clay shale | 10 | 725 |
| Sandstone, massive, **Upper Mahoning**, 20′ to | 35 | 760 |
| Limestone, **Sutton**, lenticular, 0′ to | 3 | 763 |
| Red shale, **Mahoning**, 0′ to | 5 | 768 |
| **Coal, Mahoning**, lenticular, 0′ to | 2 | 770 |
| Fire clay, **Thornton**, or sandy shale | 10 | 780 |
| Sandstone, **Lower Mahoning**, massive, often conglomeratic, 20′ to | 35 | 815 |
| Shale, dark, **Uffington**, 5′ to | 25 | 840 |
| **Coal, Upper Freeport**, top member of Allegheny Series | ... | .... |

In presenting the above general section of the Conemaugh Series, attention is called to certain radical changes in the correlation of important coals in the region under study. In previous official publications of the Surveys of both West Virginia and Maryland, the coal mined just above drainage at Thomas, and at numerous other points within the drainage of the Blackwater and Potomac Rivers, and often locally termed the "Thomas" Coal, has been classified as the Upper Freeport of the Allegheny Series, based on the fact that it occurs about 650 feet below the Pittsburgh Coal, and that another coal known locally as the "Davis" occurs approximately 175 to 200 feet below it and 825 to 850 feet below the Pittsburgh bed. Pioneer geologists evidently reached this conclusion mainly from the fact that these two intervals from the Pittsburgh Coal are almost identical with those measured over wide areas in western Pennsylvania and northern West Virginia for the Upper Freeport and Lower Kittanning Coals, respectively, and from the further fact that the sections of the Thomas and Davis Coals were believed to resemble those of the two coals mentioned. The studies of recent years by both Maryland and West Virginia, however, have proved this early assumption to be entirely erroneous. In 1916 it was established by Dr. Price, working temporarily under the Maryland

Geological Survey, that the Brush Creek Shale of the Conemaugh Series, with its typical marine fauna, occurs only 122 feet above the Davis Coal at the Kempton Mine shaft just northeast of Fairfax Knob and that red shales which are never found in the Allegheny Series, frequently occur between the Thomas and Davis Coals. In the field season of 1919 the green Ames Shale, with its typical marine fauna, was found by the writer on the south bank of the Potomac River and 0.4 mile west of the Kempton shaft. In the Thomas region the Brush Creek Shale and its fossils were also found coming 53 feet below the Thomas Coal and 130 feet above the base of the Davis bed, and the Ames, with its typical lithology and usual stratigraphic association, was found 94 feet above the base of the Thomas Coal. These various important and unmistakable determinations, as well as various others that need not be detailed, establish beyond any reasonable doubt that the Davis Coal is identical with the Upper Freeport instead of with the Lower Kittanning, and that the Thomas Coal belongs at the Bakerstown stage instead of at the horizon of the Upper Freeport, as previously supposed, and establish the further fact that the Conemaugh Series in the Upper Potomac and Blackwater regions is 840 feet thick, instead of 600 to 650 feet, as ordinarily found in western Pennsylvania and northern West Virginia.

The significant facts, as above outlined, have already been presented to the public in an admirable paper by Drs. Swartz, Price, and Bassler[1], in which the gradual expansion of the Conemaugh Series eastward from Ohio, both through Pennsylvania and West Virginia, to the North Potomac region, has been portrayed. Attention should be called, however, to an erroneous conclusion reached by these investigators. In their paper the assumption has been made that the two coals mined extensively in the vicinity of Piedmont and Westernport, 30 miles northeastward down the Potomac River from Fairfax Knob, coming approximately 600 and 625 feet, respectively, below the Pittsburgh Coal, and locally called the Upper and Lower Freeport in previous publications, represent the "Up-

[1]C. K. Swartz; W. A. Price, and Harvey Bassler, Bull. Geol. Soc. Am., Vol. 30, pp. 567-596; 1919.

per Bakerstown" and "Lower Bakerstown", respectively, and that the Cambridge or Pine Creek marine Limestone belongs between them, this latter horizon having lost its typical marine character in passing eastward and containing only brackish-water fauna in the Piedmont and Georges Creek region. That this assumption is mistaken and somewhat distorts the true section of the Conemaugh Series in the Upper Potomac and Georges Creek region appears quite evident from the following section, which was measured with hand-level and arranged in descending order by the writer on the mountain just southeast of Piedmont and south of Luke (Maryland), much care having been taken to secure true vertical intervals by local measurement between unmistakable and easily recognized horizons. after the first series of observations had been made. The measurements, as presented below, may be considered as representing true vertical intervals except possibly the Elk Lick (Barton, "Four-Foot") Coal and the Harlem Coal with its overlying Ames Shale, as in this case there is a small amount of southward rise. It is probable that the true interval between these two horizons should be little, if any, more than 100 feet instead of the 123 feet indicated in the section:

### Piedmont Section, Mineral County.

(Starting 1 mile South of Hampshire and descending S. E.)

| | Thickness. Feet. | Total. Feet | Interval. Feet. |
|---|---|---|---|
| Monongahela Series (12′) | | | |
| Coal, Pittsburgh, Silver Coal Company No. 4 Mine. (2037′ B.) fallen shut, reported.. | 12 | 12 | 12 |
| Conemaugh Series (818′) | | | |
| Concealed | 19 | 31 | |
| Coal, reported, Morantown (2018′ B.)....... | ... | 165 | |
| Concealed | 134 | 165 | |
| Wild coal, roof ..... . .<br>Coal ...... 2′ 0″<br>Rock ...... 0 4<br>Coal ...... 0 2<br>Rock ...... 0 3<br>Coal ...... 0 6<br>Rock, 1′ 2″ to ....... 2 0<br>Coal ...... 2 0<br>(7′ 3″) Little Clarksburg ("Dirty Nine-foot", Franklin) (1877′ B.) (Section reported by Lewis Grant) | 7 | 172 | 141 |

| | Thickness. Feet. | Total. Feet. | Interval. Feet. |
|---|---|---|---|
| Concealed | 105 | 277 | |
| Sandstone, massive, cliff, **Morgantown** | 33 | 310 | |
| Concealed | 22 | 332 | |
| Sandstone, shaly, **Barton** | 28 | 360 | |
| Shale, sandy | 4 | 364 | |
| **Coal, slightly** bony ...... 1′ 5″<br>Slate, bony... 0 2<br>**Coal, soft**..... 3 3<br>(4′ 10″) **Elk Lick** ("Four-Foot") (Barton) Silver Coal Company (1680′ B.) No. 3 Mine | 5 | 369 | 197 |
| **(Section continued, starting with Elk Lick Coal at Silver Coal Company No. 2 Mine east of Montgomery Run):** | | | |
| Concealed and shaly sandstone, **Upper Grafton** | 80 | 449 | |
| **Coal blossom, Federal Hill** | ... | 449 | |
| Shale, sandy | 11 | 460 | |
| Sandstone, shaly, **Grafton** | 5 | 465 | |
| Shale, sandy, partly concealed | 22 | 487 | |
| Shale, green, sandy, with marine fossils, **Ames** | 5 | 492 | |
| **Coal blossom, Harlem,** (1603′ B.) | ... | 492 | 123 |
| Concealed | 5 | 497 | |
| Sandstone, massive, partly concealed | 20 | 517 | |
| Concealed | 36 | 553 | |
| Shale, variegated, **Pittsburgh Reds** | 10 | 563 | |
| Sandstone, massive, **Saltsburg** | 30 | 593 | |
| Shale and concealed | 5 | 598 | |
| **Coal blossom, Upper Bakerstown, visible** | 2 | 600 | 108 |
| Fire clay shale | 17 | 617 | |
| Concealed | 33 | 650 | |
| **Coal blossom, Bakerstown (Thomas)** | ... | 650 | |
| Fire clay and sandy shale | 17 | 667 | |
| Limestone, ferruginous and siliceous, with marine fossils, **Pine Creek (Cambridge)** | 1 | 668 | |
| Shale, dark, laminated | 13 | 681 | |
| Sandstone, massive, **Buffalo** | 27 | 708 | |
| Shale, dark, with marine fossils, **Brush Creek** | 7 | 715 | |
| **Coal, (0′ 4″), Brush Creek (1365′ B.)** | ... | 715 | 115 |
| Sandstone, shaly | 5 | 720 | |
| Shale, sandy | 13 | 733 | |
| Sandstone, shaly, ferriferous | 10 | 743 | |
| Fire clay shale, with ferriferous limestone. | 5 | 748 | |
| Sandstone, massive, **Upper Mahoning** | 35 | 783 | |
| Shale, dark | 5 | 788 | |
| **Coal** ......... 0′ 2″<br>Slate, bony.... 0 2<br>**Coal, soft**..... 1 5<br>**Coal, bony**.... 0 3<br>**Coal, soft**..... 2 4<br>**Mahoning ("Six-foot")** (4′ 4″) | 4 | 792 | 77 |
| Fire clay and sandy shale | 18 | 810 | |
| Sandstone, massive, **Lower Mahoning** | 10 | 820 | |
| Fire clay shale | 10 | 830 | |

| | Thick-ness. Feet. | Total. Feet. | Inter-val. Feet. |
|---|---|---|---|
| **Allegheny Series (182′)** | | | |
| Shale, dark **Upper Freeport ("Split-six") Coal horizon** | 2 | 832 | 40 |
| Fire clay shale, sandy | 15 | 847 | |
| Concealed | 20 | 867 | |
| Sandstone, massive, **Lower Freeport** | 20 | 887 | |
| Concealed | 60 | 947 | |
| Sandstone, massive, **East Lynn** | 30 | 977 | |
| Shale, sandy, partly concealed | 25 | 1002 | |
| **Coal blossom, Lower Kittanning** | ... | 1002 | 170 |
| Shale, sandy | 10 | 1012 | 10 |
| **Pottsville Series (95′)** | | | |
| Sandstone, massive... 43′; Shale, sandy.......... 2; Sandstone, cross-bedded, with shaly streaks ............ 30 } **Homewood (Westernport)** | 75 | 1087 | |
| **Coal, lenticular, Tionesta, 2½′ to** | 0 | 1087 | 75 |
| Fire clay shale, flinty, **Mt. Savage** | 5 | 1092 | |
| Concealed to Potomac River just above highway bridge near pulp mill | 15 | 1107 | |

From the above section it is evident that the Conemaugh Series at Piedmont is only 818 feet thick, or if the evident rise in the measurement between the Harlem and Elk Lick Coals be eliminated it is little more than 790 feet, indicating that it has thinned southward from the maximum of 900 feet, as recorded for the northern portion of the Georges Creek Valley. It is also evident that the Pine Creek (Cambridge) Limestone, with its typical marine fauna, belongs below the two Bakerstown Coals, instead of between them as claimed by Dr. Swartz and his associates, and that the Brush Creek Coal, with its immediately overlying marine fauna, is only 115 feet below the upper of the two Bakerstown Coals, further evidence of the latter fact being furnished by a measurement made on the north side of the Potomac just north of Piedmont between the Brush Creek and Bakerstown Coals, revealing an interval of only 98 feet as compared to the interval of 185 feet given for Georges Creek. In the locality north of Piedmont the two coals are opened and their sections fully exposed and the typical Brush Creek marine fauna is present above the Brush Creek Coal. The section further indicates an interval of only 77 feet between the bases of the Mahoning and Brush Creek Coals. Another important difference is the total absence of coal or even bituminous shale between the Mahoning ("Six-Foot") and the Brush Creek, although this interval was fully exposed.

The observations made at Piedmont reveal the apparent fact that the Conemaugh Series becomes thinner in passing northeastward down the Potomac River from Fairfax Knob. As shown by the section for Fairfax, page 130, its thickness is 838½ feet, while at Piedmont it is only about 790 feet. It thus appears that the Fairfax region more nearly represents its maximum development.

The Piedmont Section, published above, contains also a measurement of the Allegheny Series and a portion of the Pottsville. Comment on the latter two series will be found in Chapters VI and VII, respectively.

## DESCRIPTION OF MEMBERS, CONEMAUGH SERIES.

### FAIRFAX LIMESTONE.

The first significant member of the Conemaugh Series is a hard, gray limestone, 2 feet thick, that is visible near the summit of Fairfax Knob, separated from the Pittsburgh Coal by about 5 feet of fire clay or shale. Inasmuch as this limestone clearly belongs above the Lower Pittsburgh Limestone and the Morantown Coal, it can not be called the Upper Pittsburgh Limestone and it is therefore designated the **Fairfax Limestone** from the locality of its occurrence. Like all the other limestones of the upper portion of the Conemaugh, it is a fresh-water deposit. Elsewhere in the county it does not occur as its horizon is above the topography.

### MORANTOWN COAL.

The **Morantown Coal** of the Maryland Survey, coming approximately 15 feet below the Pittsburgh Coal, was observed only in the top of **Fairfax Knob** where it was opened at the **Davis Coal & Coke Company Mine (No. 3 on Map II)**, at an elevation of 3182′ L. The old opening has completely fallen shut, but, according to S. B. Jeffries, Chief Engineer of the company, it has a thickness of 4′ 4″, no details being available as to its parting slates or chemical character. Inasmuch as it is not usually regarded as of commercial thickness in the region of its occurrence in the North Potomac (Georges Creek) Basin, and as its horizon is present only in a few acres at the locality named it can scarcely be classed among the valuable economic coal beds of Tucker County.

## LOWER PITTSBURGH SANDSTONE.

The **Lower Pittsburgh Sandstone,** belonging a few feet above the Little Pittsburgh Coal, appears to be represented in Tucker by a gray sandstone, nine or ten feet thick, at its proper horizon. Elsewhere in the region its horizon is entirely above the topography.

The **Pittsburgh Limestone,** belonging between the Lower Pittsburgh Sandstone and the Little Pittsburgh Coal, does not appear to be represented in the area under study.

## LITTLE PITTSBURGH COAL.

The **Little Pittsburgh Coal,** coming a few feet under the Lower Pittsburgh Sandstone, is represented in the top of Fairfax Knob by a multiple-bedded seam, approximately 6½ feet thick, coming 78 feet below the Pittsburgh Coal, as exhibited in the Fairfax Section, page 130. Elsewhere in the county its horizon is above the topography. Owing to its commercial thickness and quality it will be further described in Chapter XIII, under the subject of "Commercial Coal".

The **Lower Pittsburgh Limestone,** coming just beneath the Little Pittsburgh Coal, and the **Connellsville Sandstone,** coming a few feet under the limestone, were not definitely observed in the county. It would appear that the limestone is entirely absent but the sandstone is probably present in the sandy shale and concealed interval noted in the Fairfax Section, page 130, their horizons elsewhere being above the topography.

The **Franklin "Rider" Coal** of the Maryland Survey, apparently belonging just under the Connellsville Sandstone horizon, was not observed, its horizon in Fairfax Knob being concealed.

### LITTLE CLARKSBURG (FRANKLIN?) COAL.

The **Little Clarksburg Coal,** belonging only a few feet below the Connellsville Sandstone horizon, is apparently present in Fairfax Knob, an exposure having been noted at the **Davis Coal & Coke Company Prospect (No. 5 on Map II),** in Grant County on the eastern slope of the knob, as exhibited in the section for Fairfax, page 130. Its exposure here is imperfect but it is double- or possibly multiple-bedded, a feature that is characteristic of the Little Clarksburg Coal at its type locality. This coal has for many years been known as the **Franklin** by the Maryland Survey, but officials of that organization have lately concluded that the Little Clarksburg belongs at a lower horizon. The writer, however, believes that the earlier view of regarding the Little Clarksburg and Franklin as identical is the proper one and prefers to adhere to that classification. This coal is apparently worthless from a commercial standpoint in the Fairfax region.

Beneath the Franklin Coal the Maryland Survey lists the **Lonaconing Sandstone** and the Upper and Lower Benches of the **Lonaconing Coal,** but representatives of these members were not observed at Fairfax Knob, their horizons being partly concealed.

### LOWER CONNELLSVILLE SANDSTONE.

The **Lower Connellsville Sandstone,** coming a few feet below the Little Clarksburg Coal, was not observed in the Fairfax region, but as its apparent horizon is partly concealed it is probably present. This sandstone may possibly correlate with the **Hoffman** of the Maryland Survey.

The **Clarksburg Limestone,** belonging a few feet under the Lower Connellsville Sandstone horizon, was not observed in the Fairfax region and is apparently absent from the measures.

### NORMANTOWN (UPPER HOFFMAN) COAL.

The **Normantown Coal,** coming just below the Lower Connellsville Sandstone, appears to be represented in the Fairfax region by the **Davis Coal & Coke Company Prospect (No. 6 on Map II)**, on the eastern slope of Fairfax Knob in Grant County, as exhibited in the Fairfax Section, page 130. The opening had fallen shut, but according to local report little coal was found. This seam apparently correlates with the Upper Hoffman of the Maryland Survey.

The **Clarksburg Red Shale**, belonging a few feet under the Lower Connellsville Sandstone, and just under the Normantown Coal, appears to be represented by dark, sandy shale in the Fairfax region, in contrast to the bright, red color of its type locality.

### MIDDLE HOFFMAN COAL.

The **Middle Hoffman Coal** of the Maryland Survey, which apparently has no equivalent in the Conemaugh Series, as heretofore described throughout northern West Virginia, and belonging 175 to 200 feet below the Pittsburgh Coal, appears to be represented by the following exposure in Tucker County:

**Western Maryland Railway Exposure—No. 7 on Map II.**

On North Fork of Blackwater River, 0.8 mile northward from William; **Middle Hoffman Coal**; elevation, 3020′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, dark, sandy | | | 10 | 0 |
| **Coal** | 0′ | 11″ | | |
| Shale, gray | 0 | 2 | | |
| **Coal**, slaty | 0 | 8 | 1 | 9 |
| Shale, limy | | | 0 | 7 |
| Limestone, **Hoffman**, dark, hard, with **Spirorbis** and **pelecypods** | | | 1 | 8 |
| Fire clay and shale, sandy, to grade | | | 4 | 0 |

The correlation of the above coal is based largely on its approximate interval of 650 feet above the horizon of the Upper Freeport (Davis) Coal, as shown by the structure map, and from the fact that a dark limestone of fresh- or brackish-water origin comes below it that apparently resembles the Hoffman Limestone of Maryland. The coal was not noted elsewhere and appears to be commercially unimportant.

### HOFFMAN LIMESTONE.

The **Hoffman Limestone** of Maryland, coming almost directly under the Middle Hoffman Coal, and apparently having no counterpart in the Conemaugh Series of West Virginia west of the North Potomac Basin, was noted along the Western Maryland Railway 0.8 mile north of William, as detailed in the above description of Coal Exposure No. 7. Where exposed at that point it is hard, dark, carbonaceous, and contains fresh- or brackish-water shells in considerable quantity. It is apparently too low in the series to be correlated with the Clarksburg Limestone, as has been suggested by Dr. Price, and both its physical appearance and its fossil content differ materially from any occurrence of the Clarksburg Limestone in the vicinity of its type locality.

Below the Hoffman Limestone there is an interval of approximately 70 feet in the Fairfax region, partly occupied by dark or sandy shales, but largely concealed, in which the **Lower Hoffman Coal, Clarysville Sandstone,** and **Upper and Lower Clarysville Coals** of the Maryland Survey belong, none of which has any counterpart in the recognized Conemaugh section of West Virginia. Some of these members may be present in the region in some slight development, but as several of the coal test borings published in Chapter XIII start near the top of this interval and reveal no coals, it appears quite certain that beds of economic value are lacking.

### MORGANTOWN SANDSTONE.

The **Morgantown Sandstone,** usually gray in color and weathering to brown, was not noted at outcrop in Tucker County but has been identified in coal test borings Nos. 16 and 35, as published in Chapter XIII, its thickness varying from 20 to 40 feet and its interval above the Upper Freeport (Davis) Coal being 550 to 560 feet.

The **Orlando Limestone,** coming between the Morgantown Sandstone and the Elk Lick Coal, and carrying a fresh- or brackish-water fauna at its type locality in Braxton County, was not observed in Tucker. It is barely possible that this limestone may be the same as the Wellersburg Limestone of the Maryland Survey which has been noted as occurring within the interval named.

In the same interval between the Morgantown Sandstone and Elk Lick Coal, officials of the Maryland Survey name several members as occurring in the expanded eastern section, their succession in descending order being as follows:

Morgantown Red Bed
Wellersburg "Rider" Coal
Wellersburg Coal
Wellersburg Limestone
Barton "Rider" Coal
Barton Sandstone.

Of these members the Morgantown Red Bed appears to be represented in some of the coal test borings published in Chapter XIII, and the Barton Sandstone is noted in coal test No. 16.

## ELK LICK COAL.

The **Elk Lick Coal,** coming just below the Morgantown Sandstone at its type locality, but clearly belonging 50 to 100 feet below it in the Fairfax region on account of the eastward expansion of the series, was not noted at outcrop, but in Chapter IV it is noted in the section for Fairfax and in Chapter XIII it is recorded in coal test borings Nos. 20, 35, 39, and 42. As may be seen from the inspection of these records, it is seldom more than one foot in thickness and has no commercial possibilities.

In the coal region of western Maryland immediately adjacent to Tucker County, this coal has been known by the local titles **"Barton"** and **"Four-Foot"** and it has been correlated generally with the Bakerstown in the Survey publications of that State. That it is not the true Bakerstown Coal of Pennsylvania but belongs 200 to 250 feet above it in the Potomac region has been clearly proved by Dr. Swartz and his associates in their notes on the Coal Measures of Maryland previously cited, and that it is the true Elk Lick Coal seems fairly well established by the same authorities.

### BIRMINGHAM SHALE.

The Birmingham Shale, coming a few feet under the Elk Lick Coal, appears to be the next stratigraphic horizon that can be recognized in the Fairfax region. In the section for Fairfax, page 131, it is noted as 67 feet thick, coming just under the coal, and being composed of red and variegated shales. This member appears to have completely replaced the **Elk Lick Limestone** and the **West Milford Coal**, neither of these members having been noted either at outcrop or in the numerous borings which have pierced their horizons.

### UPPER GRAFTON SANDSTONE.

The Upper Grafton Sandstone of Dr. Swartz and his associates[2], apparently coming within the body of the Birmingham Shale, and defined as being just under the West Milford Coal, and described as being a massive member, is noted in Chapter XIII in coal test boring No. 10, where it is 38 feet thick. It was not observed at outcrop.

Beneath the Upper Grafton Sandstone there is a variegated shale horizon evidently part of the Birmingham deposits in which the Maryland Survey notes the **Federal Hill Coal**, a member that does not appear to be present in the Fairfax region.

### GRAFTON SANDSTONE.

The **Grafton Sandstone**, occupying a portion of the interval between the Elk Lick and Harlem Coals, lying just above the Ames Shale at the type locality of the sandstone, and being usually massive, reddish-brown, and sometimes pebbly, appears to be present generally in the Conemaugh sediments of the Fairfax region. A portion of this ledge still remains on the ridge west of Coketon, as noted in the section for Douglas, page 125, and near Thomas it is visible at an elevation of 3060′ B., just northwest of coal test boring No. 9, being 20 feet thick and 70 feet above the top of the hole. In Chapter IV

[2]C. K. Swartz, W. A. Price, and H. Bassler, Bull. Geol. Soc. Am., Vol. 30, pages 573 and 595; 1919.

it is also noted in the sections for Thomas and Fairfax, and in Chapter XIII it is recorded in coal test borings Nos. 6, 10, 12, 14, 16, 18, 19, 20, 37, 38, 39, 41, 42, and 52, its thickness varying from 4 to 60 feet.

In Monongalia and other counties of the Monongahela Valley, the Grafton Sandstone has been quarried to a limited extent for building purposes, its per-oxidized, reddish-brown color, durable quality and smooth texture giving it a value that has never been fully recognized by the building trade. No quarries were observed in Tucker County, but suitable localities for its exploitation could doubtless be found in the region of its outcrop.

### AMES LIMESTONE AND SHALE.

The **Ames Limestone,** subdivided by Hennen into the **Upper Ames Limestone, Ames Shale,** and **Lower Ames Limestone,** and belonging between the Grafton Sandstone and Harlem Coal, is apparently represented in the Fairfax region only by the shale member, no distinctively limestone strata having been observed. As noted in the region it is dark-green, laminated, and argillaceous, and carries some of the diagnostic marine fossil species that characterize it in several States, its thickness varying from 5 to 20 feet. In Chapter IV it is noted in the sections for Douglas, Thomas, and Fairfax, and in Chapter XIII it is recorded in coal test borings Nos. 6, 10, 12, 16, 20, 21, 26, 34, 38, 39, 40, and 42. Its outcrop at various localities will be noted under the description of the Harlem Coal which it closely overlies.

Dr. Swartz and his associates of the Maryland Survey note that the Ames horizon is split into several subordinate members in the Potomac region, their succession in descending order being as follows:

**Skelley Limestone in Ohio, Upper Ames eastward**
**Harlem "Rider" Coal**
**Ames Red Bed**
**Ames Limestone and Fauna.**

In the Fairfax region the coal and red beds seem to be absent, and, as stated above, the limestone is represented by shale only.

## HARLEM COAL.

The **Harlem Coal**, belonging just under the Ames marine stage, and being of wide-spread occurrence throughout several States, is a persistent horizon in the Fairfax region of Tucker County, being single-bedded, and varying in thickness from 0′ 6″ to 2′ 0″. It does not attain commercial thickness and has no present economic value, but as a stratigraphic marker it is an important horizon. In Chapter IV its position and thickness are noted in the sections for Douglas, Thomas, and Fairfax, and in Chapter XIII it is recorded in coal test borings Nos. 6, 10, 12, 14, 16, 19, 20, 21, 26, 34-43, inclusive, and 52. The following surface exposures were noted:

### Davis Coal & Coke Company Exposure—No. 8 on Map II.

On ridge west of North Fork of Blackwater River and 0.5 mile west of Coketon; **Harlem Coal**; elevation, 3171′ B. See Douglas Section, page 125, for details.

### Davis Coal & Coke Company Exposure—No. 9 on Map II.

On North Fork of Blackwater River at Thomas; **Harlem Coal**; elevation, 3085′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, greenish, fragmentary exposure, **Ames** | | | .. | .. |
| **Coal** | 0′ | 6″ | | |
| Shale, gray | 0 | 6 | | |
| **Coal** | 0 | 10 | 1 | 10 |
| Fire clay shale | | | | |

### Davis Coal & Coke Company Exposure—No. 10 on Map II.

On North Branch of Potomac River just south of Kempton, Grant County; **Harlem Coal**; elevation, 2720′ B.

| | Ft. | In. |
|---|---|---|
| Shale, dark, green, with marine fossils, **Ames** | 0 | 0 |
| **Coal** | 0 | 4½ |
| Shale, dark, green with marine fossils, **Ames** | 0 | 0 |

## EWING LIMESTONE.

The **Ewing Limestone** of the Ohio Geological Survey, coming a few feet under the Harlem Coal, and being of fresh- or brackish-water origin, was not observed at outcrop in the Fairfax region, but in Chapter XIII it is recorded in coal test boring No. 33, as being 6 feet thick, coming 39 feet above the Saltsburg Sandstone. Many other borings in the region have pierced its horizon without noting it, so that its occurrence may be considered as very lenticular.

### PITTSBURGH RED SHALE.

The **Pittsburgh Red Shale**, belonging in the interval between the Ewing Limestone and Saltsburg Sandstone, and frequently occupying the entire horizon between the Harlem Coal and the Saltsburg when the Ewing is absent, is a persistent member of the Conemaugh Series of the Fairfax and Thomas region. At the top, just under the coal there is usually a yellowish-gray stratum that doubtless represents the Ewing horizon, followed by 20 to 50 feet of red and variegated, slickensided shale, largely devoid of vegetable remains, and being frequently divided into two benches by the Jane Lew Sandstone. In Chapter IV its position and thickness are noted in the sections for Douglas, Thomas, and Fairfax, and in Chapter XIII it is recorded in coal test borings Nos. 35, 37, 39, and 52. At outcrop in the valley of North Fork at Blackwater River it is conspicuous in the top of the ridge west of Coketon, along the Benbush road just west of Thomas, and in the hillside just east of Pierce, there being other frequent outcrops.

At various points in the Monongahela Valley and elsewhere this shale has been used for the manufacture of building and paving brick, its iron content causing it to burn to a deep-red color. As a paving brick it is not as durable as standard fire clay material but its local use where better clay is not available is often justified on the basis of its cost in comparison to imported brick.

At the base of the Pittsburgh Red Shale and just above the Saltsburg Sandstone, Dr. Swartz and his associates of the Maryland Survey note the presence of the **Woods Run Limestone and Fauna**, no description of the member being furnished. This horizon was not observed in the Fairfax region.

### JANE LEW SANDSTONE.

The Jane Lew Sandstone, coming about the middle of the Pittsburgh Red Shale and dividing the same into two benches, and at its type locality in Lewis County being massive, greenish-gray, weathering to brown, appears to be persistent in the region of Fairfax and Thomas. In Chapter IV it is noted in the section for Fairfax, and in Chapter XIII it is recorded in coal test borings Nos. 12, 16, 19, 20, 21, 27, 34, 37, 40, 43, 50, 52, and 61, its thickness varying from 12 to 50 feet.

### SALTSBURG SANDSTONE.

The **Saltsburg Sandstone**, belonging below the Pittsburgh Red Shale and just above the Bakerstown Coal, and being usually massive and conglomeratic, sometimes gray on fresh fracture but more often reddish-brown on account of its iron oxide content, and varying in thickness from 10 to 50 feet, is a persistent horizon in the Thomas and Davis region although its outcrop is usually largely concealed. In Chapter IV it is noted in the sections for Douglas, Thomas, and Fairfax, and in Chapter XIII it is recorded in coal test borings Nos. 10, 12, 13, 14, 18, 19, 20, 21, 26, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 50, 58, 60, 63, and 65.

At various localities in northern West Virginia notably at Kingwood, Preston County, the Saltsburg Sandstone has been quarried for building purposes and has proved to be very desirable, owing to its smooth texture, pleasing appearance, and workable quality. Suitable outcrops for quarrying were not observed in the Thomas region, however, the ledge being frequently shaly. It is possible that extensive excavation into the outcrop might reveal suitable stone but in view of the evidence such action could not be advised.

Between the Saltsburg Sandstone and the Bakerstown (Thomas) Coal, Dr. Swartz and his associates of the Maryland Survey note the **Portersville Limestone and Fauna.** In the Thomas region this interval is usually occupied by 5 to 10 feet of black, laminated, sandy shale, no limestone or fossils having been observed. It is possible that an intensive search might reveal these fossils.

### BAKERSTOWN (THOMAS) COAL.

The **Bakerstown Coal**, coming a short distance under the Saltsburg Sandstone from which it is often separated by a few feet of sandy shale, and being of wide-spread occurrence throughout western Pennsylvania, northern West Virginia, and western Maryland, appears to be represented in the North Potomac Basin of Tucker County by a coal that has an approximate interval of 650 feet below the Pittsburgh. This coal, which has been correlated in previous official Survey reports of both West Virginia and Maryland as the Upper Freeport, largely on account of the above interval, and which has been known locally as the "Thomas" seam in the Blackwater Valley, has been proved beyond reasonable doubt, as detailed in the general account of the Conemaugh Series at the beginning of this Chapter, to belong at the Bakerstown Coal horizon, and it will be described as such in this volume.

A careful study of the Thomas seam on North Fork of Blackwater River reveals the fact that the lower portion of its bed section is almost exactly similar in physical appearance and quality to that of the Bakerstown Coal of Preston County. In Preston County the Bakerstown Coal is typically composed of a bench of good, soft coal at the base, 3 to 4 feet in thickness, followed by a bench of interlaminated bony coal, slate and soft coal, 1 to 1½ feet in thickness, making a total of 4 to 5½ feet In the Thomas region the same bed of soft coal is present at the base, followed by a bench of interlaminated material similar to that found in Preston County, and followed in turn by two to three feet of soft coal. With the exception of this latter bench, the sections present a striking resemblance, as Figue 3, prepared by Tucker, will show, the column at the left being a plotted section of the Davis Coal & Coke Company No. 24 Mine (No. 11 on Map II), near Thomas, and that on the right being a section of the Edward Brown Farm Mine in Preston County, near Reedsville, as published in the Preston County Report of the Survey, page 135. Inasmuch as the Bakerstown Coal gradually thins out from Preston County westward, first losing the bony strata at the top and finally the soft coal of the bottom bench, it is not surprising that an additional bench of good coal should be found at Thomas in the region of maximum Conemaugh sediments.

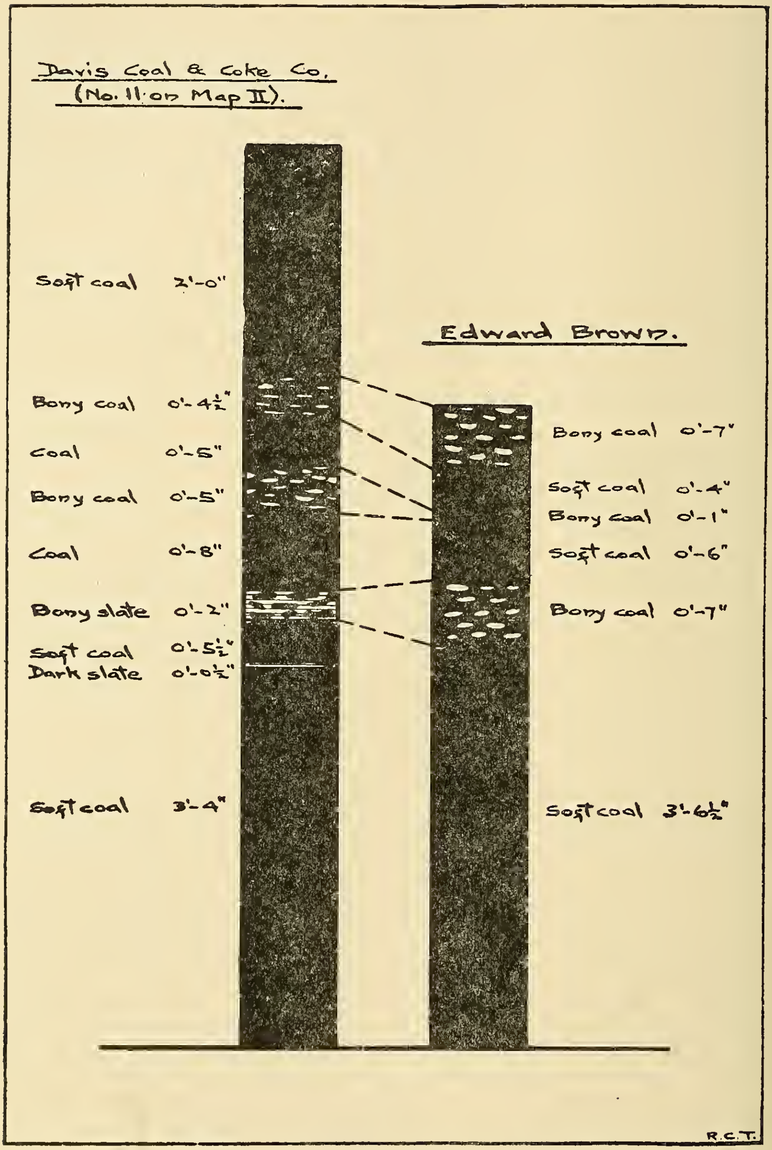


Figure 3.—Comparative sections of Bakerstown Coal in Tucker and Preston Counties.

The outcrop of the Bakerstown (Thomas) Coal has been delineated on Map II and a discussion of its quality and chemical character, together with numerous bed sections, will be presented in Chapter XIII, under the subject of "Commercial Coal." In Chapter IV its stratigraphic association is indicated in the sections for Douglas, Thomas, and Fairfax.

### ALBRIGHT LIMESTONE.

The **Albright Limestone**, coming just under the Bakerstown Coal, was not observed at outcrop in the county but in Chapter XIII its presence is recorded in coal test borings Nos. 8, 33, and 38, its occurrence being evidently lenticular, as numerous other borings have pierced its horizon. In the three borings noted. its thickness varies from 1½ to 6 feet. At its type locality this limestone is dark-gray in color and of non-marine origin.

The **Upper Bakerstown Coal**, which occurs 15 to 25 feet above the Bakerstown (Thomas) seam in the vicinity of Piedmont and Georges Creek farther northeast, does not appear to be represented in Tucker County, its horizon being occupied by sandy shale.

### PINE CREEK LIMESTONE.

The **Pine Creek Limestone**, belonging 15 to 40 feet below the Bakerstown (Thomas) Coal, and only a few feet above the top of the Buffalo Sandstone, was not observed at outcrop in the county, but in Chapter XIII it is recorded in coal test boring No. 38. This limestone, which in many publications has been referred to as the **Upper Cambridge**, or **Cambridge Limestone**, is usually ferruginous and siliceous, seldom more than one foot in thickness, and often carries an abundant marine fauna, making it a valuable stratigraphic marker. Its position in the Conemaugh Series, with its relationship to the two Bakerstown Coals, is exhibited in the Piedmont Section, page 154.

### MEYERSDALE RED SHALE.

The **Meyersdale Red Shale** of Dr. Swartz and his associates of the Maryland Survey[3], described as occurring just above the Buffalo Sandstone, appears to be present in the Thomas region, its horizon being usually largely concealed by debris. In Chapter XIII it is recorded in coal test borings Nos. 18, 19, 20, and 21, with a thickness varying from 3 to 10 feet.

### BUFFALO SANDSTONE.

The **Buffalo Sandstone,** belonging 15 to 40 feet below the Bakerstown (Thomas) Coal, and 5 to 15 feet below the Pine Creek Limestone horizon, is well represented in the Thomas region, being a coarse, massive stratum, often conglomeratic, and making cliffs or benches in the topography. Along the North Potomac Syncline it emerges from drainage on the North Fork of Blackwater River at the Thomas railroad station, forming a low cataract in the stream at that point. A short distance below the station it is visible above the railroad track for a considerable distance, being massive and pebbly and 20 to 30 feet thick. Farther southwest the rise of the strata takes it entirely above the railroad cuts but it may be seen at various points. East of the railroad it is not so prominent but may be recognized at several points. In the Stony River Syncline it was noted at a few points in the cut-over region north of Laneville. In Chapter IV its stratigraphic position is exhibited in the sections for Thomas, Fairfax, and Red Creek, and in Chapter XIII it is recorded in coal test borings Nos. 2, 4, 5, 6, 8, 9, 10, 12, 14, 16, 19, 20, 21, 26, 27, 28, 29, 30, 32, 33, 35, 36, 38, 39, 44, 45, 55, 60, 62, 63, 64, 65, and 83, its thickness varying from 5 to 45 feet.

In some counties this sandstone has been used for building stone but in Tucker no quarries were noted. Owing to its uneven texture and frequent shaly streaks, it would not prove successful as an ornamental stone but at some points might be quarried for rough construction work if desired.

### BRUSH CREEK LIMESTONE AND SHALE.

The **Brush Creek Limestone** coming almost directly above the Brush Creek Coal, and the **Brush Creek Shale,** in which

[3]C. K. Swartz, W. A. Price, and H. Bassler, Bull. Geol. Soc.. Am., Vol. 30, pp. 574 and 595; 1919.

the limestone is usually contained and which is an integral part of the marine faunal stage that accompanies the limestone, are represented in the Blackwater region by the shale only, the limestone not having been observed. In Tucker County this shale is a bluish-black, argillaceous, and laminated deposit, varying in thickness from 5 to 20 feet, occurring between the Buffalo Sandstone and the Brush Creek Coal, and carrying a scanty marine fauna. It is visible along the Davis Branch of the Western Maryland Railway, 0.3 mile south of Coketon and just north of the Davis Coal & Coke Company No. 24 Mine (No. 11 on Map II), at an elevation of 3037′ B., as exhibited in the section for Douglas, page 125, and carries a limited fauna. It is also visible beneath the Buffalo Sandstone along the main line of the railroad just below the station at Thomas, and on the Sugarland Road, 1.9 miles southwest of Benbush, no fossils having been noted at either of the latter localities. At Kempton it was discovered in 1916 by Dr. Price in the shaft of the Davis Coal & Coke Company No. 42 Mine (No. 57 on Map II), where he reports the following section:

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| Sandstone, (Buffalo) | | | | 12 | 0 |
| Shale, gray | 4′ | 0″ | Brush Creek | 32 | 2 |
| Shale, blue, sandy | 16 | 0 | | | |
| Shale, black | 12 | 2 | | | |
| Coal, Brush Creek | | | | 1 | 2 |
| Interval to top of Davis (Upper Freeport) Coal | | | | 120 | 0 |

"Fossils from 1 to 9 feet above the Brush Creek Coal."

In Chapter IV its position is noted in the sections for Douglas, Thomas, Fairfax, and Red Creek, and in Chapter XIII it is recorded in coal test borings Nos. 8, 9, 19, 26, 29, 31, 32, 33, 34, 35, 37, 38, 39, 40, 41, 42, 43, 44, 54, 62, 63, 64, and 65, indicating its general occurrence at its proper horizon. As an economic member of the series it has no value, but as a stratigraphic marker it is of prime importance.

### BRUSH CREEK COAL.

The **Brush Creek Coal,** coming just below the Brush Creek marine stage, and being a single-bedded stratum varying in thickness from a few inches to two feet, but widely persistent over several States, is generally present in the Conemaugh deposits of Tucker County in characteristic form. In this region its interval above the Upper Freeport (Davis) Coal is approximately 125 feet, as compared to 60 feet or less in the Monongahela Valley, the greater figure being due to the eastward expansion of the series. In Chapter IV it is noted in the sections for Douglas, Thomas, Fairfax, and Red Creek, and in Chapter XIII it is recorded in coal test borings Nos. 2, 4, 7, 8, 12, 13, 14, 16, 18, 19, 20, 26, 28, 29, 32, 33, 34, 35, 37, 38, 39, 40, 41, 42, 45, 50, 55, 60, 62, 63, 64, and 65.

As an economic deposit this coal has little or no present value but as a stratigraphic marker its presence is always worth recording. The following exposures were noted:

### Western Maryland Railway Coal Exposure—No. 26 on Map II.

On east side of North Fork of Blackwater River, 0.3 mile south of Coketon; **Brush Creek Coal**; elevation, 3037′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Sandstone, shaly, **Buffalo** | | | 7 | 0 |
| Shale, dark, marine fauna, **Brush Creek** | | | 7 | 0 |
| **Coal** | 0′ | 1″ | | |
| Fire clay and shale | 0 | 4 | | |
| **Coal** | 1 | 4 | 1 | 9 |
| Fire clay shale to grade | | | 5 | 0 |

### Mine No. 27 on Map II.

Along Sugarland Road, 1.5 miles west of Benbush; **Brush Creek Coal**; elevation, 3245′ B.

| | Ft. | In. |
|---|---|---|
| Shale, sandy, **Brush Creek** | .. | .. |
| Fire clay, flinty | 5 | 0 |
| **Coal** | 0 | 5 |
| Fire clay shale | | |

#### UPPER MAHONING SANDSTONE.

The **Upper Mahoning Sandstone**, belonging a few feet under the Brush Creek Coal, from which it is usually separated by 5 to 15 feet of sandy shale or fire clay, is generally present in the Conemaugh Series of Tucker County. As a rule it is massive, coarse-grained and medium-hard, its color being a dark shade of gray, due to the presence of minute flakes of brown mica that give it much the appearance of unbolted corn meal, its thickness varying from 5 to 50 feet, 20 to 35 feet being the average. It is much less conspicuous than the Lower Mahoning which comes a few feet below it, and for that reason is often entirely concealed in the slope above the more massive horizon. In Chapter IV it is noted in the sections for Thomas, Fairfax, and Stonecoal Run of Red Creek, and in Chapter XIII it is recorded in coal test borings Nos. 2, 4, 5, 7, 8, 9, 10, 12, 13, 16, 18, 21, 22, 26, 28, 29, 33, 34, 37, 38, 39, 40, 44, 45, 46, 47, 48, 49, 50, 53, 54, 55, 56, 59, 60, 62, 64, 65, and 83.

### SUTTON LIMESTONE.

The **Sutton Limestone**, a dark-gray, siliceous limestone, weathering yellow, and being 2 feet or less in thickness and coming just below the Upper Mahoning Sandstone in Braxton County, was not observed at outcrop, but in Chapter XIII its presence is indicated in the record of coal test boring No. 32, there being 2 feet of limestone at its proper horizon. Owing to its extremely lenticular occurrence it has no economic value and but little scientific interest in Tucker County.

### MAHONING RED SHALE.

The **Mahoning Red Shale** of Dr. Swartz and his associates[4], indicated as coming near the horizon of the Mahoning (Gallitzin) Coal, seems to be present in the Conemaugh Series of Tucker County. Its true position in the series is not clearly defined by the authors named, as it is first listed as coming above the coal and later defined as coming below the coal and the Thornton Fire Clay. In Tucker County, however, this member is visible in the public highway on the west side of North Fork of Blackwater River, one-fourth mile southwest of Coketon, and directly west of the Davis Coal & Coke Company No. 37 Mine (No. 48 on Map II), coming 5½ feet above the Mahoning Coal and being 5 feet thick, as indicated in the Douglas Section, page 125. Inasmuch as no red shale was found in the Conemaugh Series below the coal at any point

[4] C. K. Swartz, W. A. Price, and H. Bassler, Bull. Geol. Soc. Am., Vol. 30, pp. 574 and 595; 1919.

in the county it is presumed that the Douglas Section represents its true position.

In Chapter XIII this shale is recorded in coal test borings Nos. 10, 50, and 82, its thickness varying from 4 to 10 feet, many other borings having pierced its horizon without finding it, indicating that its occurrence is infrequent. Its presence at this stage is of more than casual interest, however, as no other red shale is found below it in the Pennsylvanian Rocks, and it marks the lowest depth at which oxidation of the deposits of this period began, the occurrence of red sediments becoming more abundant for several hundred feet upward in the Conemaugh. Dr. I. C. White is of the opinion[5] that its oxidation has largely taken place subsequent to its deposition, as it is only found in the high plateau region of the Alleghany Mountain region where its horizon has been exposed for a long period of time at the upturned edges of the basins.

## MAHONING COAL.

The **Mahoning Coal,** coming between the two Mahoning Sandstones, and belonging immediately under the Mahoning Red Shale, appears to be present only at infrequent points in Tucker County, being usually less than two feet in thickness when found. In Chapter XIII its presence is noted in coal test borings Nos. 12, 14, 21, 37, 40, 45, 47, 49, 53, 54, 60, 62, 64, 65, and 82. As an economical deposit it is of no present value, owto its thin and lenticular occurrence, but as a stratigraphic marker it is a significant horizon. The following exposures were noted.

### Cumberland Coal & Coke Company—No. 28 on Map II.

On east side of North Fork, 0.7 mile southeast of Douglas; Mahoning Coal; elevation, 3075′ B. Fallen shut, thickness unknown.

### Coal Exposure—No. 29 on Map II.

On west side of North Fork, 0.3 mile southwest of Coketon; Mahoning Coal; elevation, 2957′ B.

| | Ft. | In. |
|---|---|---|
| Coal | 0 | 6 |

[5]Personal interview.

The **Mahoning Limestone**, described as lying just below the Mahoning Coal, was not observed at outcrop in the county and is not recorded in any of the records of borings available, and is therefore presumably absent.

### THORNTON FIRE CLAY.

The **Thornton Fire Clay**, occurring just under the Mahoning Coal when the Mahoning Limestone is absent, and being an economic horizon of considerable value at its type locality in Taylor County, was not observed at outcrop in the county, its horizon being usually occupied by sandy shale. In Chapter XIII it is noted in coal test boring No. 50, as being 20 feet thick. As it is not noted elsewhere, prospecting or mining for it could not be advised.

### LOWER MAHONING SANDSTONE.

The **Lower Mahoning Sandstone**, coming below the Thornton Fire Clay horizon, and at an interval of 0 to 25 feet above the Upper Freeport (Davis) Coal, is present generally in the Conemaugh Series of Tucker County. It is a massive, coarse, gray ledge, frequently conglomeratic, and varying in thickness from 5 to 60 feet, its average being from 20 to 35 feet. In the North Potomac Basin it is exposed as many points on either side of North Fork of Blackwater River, emerging from drainage in the vicinity of Coketon and gradually rising upward toward the southwest. It is also visible at numerous points along the western rim of the basin at the eastern foot of Backbone Mountain, and on the eastern rim of the basin it is likewise present. In the Stony River Basin it is present on either rim of the syncline in the cut-over wilderness northeast of Laneville. In Chapter IV it is noted in the sections for Douglas, Thomas, Fairfax, and Stonecoal Run of Red Creek, and in Chapter XIII it is recorded in coal test boring No. 1, where it has apparently coalesced with the Upper Mahoning into a massive deposit 89 feet in thickness, and in Nos. 2-10, inclusive, 12, 13, 14, 18-22, inclusive, 26, 31, 32, 34, 36-45, inclusive, 48, 50, 53, 55, 56, 57, 59, 60, 62, 64, 70, 71, 73, 74, and 83.

As an economic horizon its principal function has been to preserve from erosion many acres of valuable Upper Freeport (Davis) Coal. As a building stone it could be used for structures where massive and durable masonry is desired but its texture is hardly suitable for residential or ornamental purposes.

This sandstone has been quarried for building purposes on a small scale at the western edge of Davis, at the locality of Coal Exposure No. 62 on Map II, being coarse, medium-hard, and gray, with streaks of iron oxide. Only 5 to 10 feet of the lower portion of the ledge is quarried, its elevation being 3150′ B., coming just above the Upper Freeport (Davis) Coal, the total thickness of the deposit, as exposed, being 30 feet. The quarry is 25 feet long and extends into the hill 15 feet .

## UFFINGTON SHALE.

The **Uffington Shale,** coming between the Lower Mahoning Sandstone and the Upper Freeport Coal, is generally present in the Conemaugh Series of Tucker, its thickness varying from 5 to 25 feet. As a rule it is a dark, laminated, sandy horizon, characterized by numerous plant fossils. In many of the earlier publications of the Survey it has been described as a marine faunal horizon, due to certain collections which were made in the Monongahela Valley by Dr. John J. Stevenson and which were ascribed to its horizon. In recent years, however, Dr. Price has established the fact that these early collections were made at the Brush Creek Limestone and Shale horizon, instead of at the Uffington stage, and it is now regarded as a fresh-water deposit.

In Chapter IV its position is noted in the sections for Douglas, Thomas, Fairfax, and Stonecoal Run of Red Creek. In Chapter XIII it is recorded in coal test borings Nos. 3, 14, 16, 20, 21, 22, 27, 28, 33, 37, 39, 40, 44, 45, 50, 55, 60, 70, 71, 74, 83, and in the same Chapter it is noted in the descriptions of several mines in the Upper Freeport (Davis) Coal.

# CHAPTER VI.

## STRATIGRAPHY--ALLEGHENY SERIES.

### GENERAL ACCOUNT AND SECTION, ALLEGHENY SERIES.

The Allegheny Series of the Pennsylvanian Period forms a considerable portion of the rock system of northeastern Tucker. Along the North Potomac Syncline, next to Grant County, it is completely buried under more recent strata, but on the western limb at the Tucker-Preston Line, its outcrop starts at the foot of Backbone Mountain and extends southwestward, approximately parallel to the mountain, for eight miles to the face of the mountain north of Blackwater River. Here it swings eastward, crossing the North Fork of Blackwater and the North Potomac Syncline in the vicinity of Douglas and Coketon and then trends northeastward by way of Davis until it finally crosses the Blackwater Anticline near the northeastern corner of the county and extends southward along the eastern limb of that arch for three or four miles before passing into Grant County. Along the southwestward extension of the North Potomac Syncline, the series outcrops with a considerable area in the angle between Blackwater River and Dry Fork, and west of the latter stream it occurs again in the broad summit of Green Mountain and in certain isolated peaks of McGowan Mountain, as shown on Map II. In the Stony River Syncline at the southeastern corner of the county, it outcrops on either limb of the basin but is buried under more recent strata along the axis near the headwaters of Red Creek, northeast of Laneville.

The series begins with the top of the Upper Freeport (Davis) Coal and extends down to the top of the Homewood Sandstone of the Pottsville, being 100 to 150 feet thick, and composed of alternating beds of coarse, gray and sometimes pebbly sandstone, sandy or argillaceous shale, plastic or flinty fire clay, impure and siliceous limestone, and coal. Lithologically it contains approximately 47.3 per cent. of sandstone, 10.0 per cent. of shale, 17.3 per cent. of fire clay, 12.7 per cent. of limestone, and 12.7 per cent. of coal. The occurrence of the series in Tucker County, as above described, represents a decidedly decadent phase, its normal thickness in northern West Virginia and western Pennsylvania being about 250 feet. In Tucker there is only one coal, the Upper Freeport (Davis) seam, that is of general commercial thickness and purity, as compared to five or six minable beds that sometimes occur in other regions, although nearly all the typical coals are represented by thin beds. Flint fire clays, also, which constitute valuable economic members elsewhere, are infrequent. The greatest thinning appears to have taken place within the Kittanning stage in the lower portion of the series, both the coals and sandstones, as well as the usual fire clays, being but poorly represented.

Referring again to the base of the series it is well to state that the view has recently been advanced by Dr. Swartz and others[1], based largely on the evidence of fossil plants, that the true base of the Allegheny Series may belong more properly at the base of the Mount Savage Coal stage of Pennsylvania and Maryland and at the top of the Sampson Rock conglomerate, the interpretation of its base depending largely on whether flora or lithology be accepted as the standard. The Mount Savage Coal stage includes the Mount Savage Sandstone and the Mount Savage (Mercer) Coals and Fire Clays coming below it. The Mount Savage Sandstone apparently correlates perfectly with the Homewood Sandstone of the various Pennsylvania Geological Surveys, having been traced from Homewood, Beaver County, Pennsylvania, to the Mount Savage region of the Georges

[1]C. K. Swartz, W. A. Price, and H. Bassler, Bull. Geol. Soc. Am. Vol. 30, pp. 567-596; 1919.

Creek Basin, Maryland, by numerous investigators, and the Mount Savage Coals apparently correlate with the Mercer Coals of western Pennsylvania, having also been traced with much detail. The Sampson Rock conglomerate, mentioned by Dr. Swartz and his associates, apparently correlates with the Upper Connoquenessing Sandstone of Beaver County, Pennsylvania. In northern West Virginia, the Allegheny Series is present with its full normal thickness, and with practically all of its coals and other distinctive beds, in Monongalia, Preston, Marion, Taylor, Barbour, Randolph, and Upshur Counties. In all of these counties the Homewood Sandstone of the Pottsville occurs just below the Allegheny, with its typical and easily recognized lithology and plant life, followed in turn by the Mercer Coals and Fire Clays, which are followed in turn by the Upper Connoquenessing Sandstone, the distinctive lithology and plant life of which varies but little from place to place. Recognition of the claim that the Mount Savage stage belongs in the Allegheny would involve the removal of 100 feet or more of apparently typical Pottsville sediments and would place in the Allegheny Series of the counties of West Virginia named above several coals which can not be so included without the introduction of new titles, resulting in endless confusion. In view of the evidence stated above, the base of the Allegheny Series in Tucker County is placed at the top of the Homewood Sandstone, as heretofore recognized and described in the northern counties of West Virginia, its most prominent and distinctive outcrop in the county being in the vicinity of Douglas on North Fork of Blackwater River, where its top is only a few feet above drainage, its full thickness being exposed in the falls and gorge below the town. In further support of this interpretation reference may be made to the Piedmont Section, page 155, where the relationship of the upper members of the Pottsville to the Allegheny, as indicated by the sequence and lithology of the beds, is quite apparent.

At the top of the Allegheny Series, as limited in the present volume, a division line has been determined that is radically different from the Conemaugh-Allegheny contact of former publications both of the West Virginia and Maryland Surveys.

Earlier geologists, who conducted pioneer investigations in the North Potomac Basin, apparently assumed a standard thickness of 600 to 650 feet for the Conemaugh Series for West Virginia, western Pennsylvania and Maryland, in consequence of which the coal long mined just above drainage at Thomas and known locally by that name was correlated as the Upper Freeport, and the seam coming 180 to 200 feet below the Thomas, known locally as the "Davis" because of its having been mined near that town, as well as by shaft at Thomas, was correlated as the Lower Kittanning. Investigations in the last few years, however, have proved these early assumptions to be entirely erroneous. The principal discovery responsible for this correction was made in 1916 by Dr. Price who examined the shaft wall of the mine at Kempton, 0.75 mile north of Fairfax Knob, and found the typical marine fossils of the Brush Creek Shale coming 122 feet above the Davis Coal. Subsequent to this important discovery, the writer, in the summer of 1919, found the Ames Shale, with its typical lithology and marine fossils, at a point just south of the Potomac River and 0.4 mile westward from the Kempton mine shaft. The presence of these two fossil zones of the Conemaugh Series, both of wide persistence and unmistakable identity, coupled with the presence of red shales which occur sometimes to a distance of 150 feet below the Thomas Coal in this region, and which are never known in the Allegheny Series, leads to the conclusion that the Davis Coal must be correlated with the Upper Freeport, that the Thomas Coal must be the Bakerstown, and that the thickness of the Conemaugh Series at Fairfax Knob, instead of being only 600 to 650 feet, becomes 838 feet, as detailed in the section for that point, page 130. Numerous other observations, in the vicinity of Thomas and elsewhere in the basin, confirm and strengthen the conclusion stated above, as detailed elsewhere in this volume.

The eastward thickening of the Conemaugh Series and consequent revision of the Conemaugh-Allegheny contact, as mentioned above, has been well described by Dr. Swartz and his associates in the paper previously cited, certain investigations of the writer in the vicinity of Fairfax Knob having been included.

The following general section, compiled from the measured sections published in Chapter IV, as well as from numerous other detailed observations, shows the Allegheny Series for Tucker County:

General Section of the Allegheny Series for Tucker County.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Shale, dark, **Uffington**, basal member of Conemaugh Series.......................... | ... | ... |
| **Coal, Upper Freeport (Davis)**, multiple-bedded, soft and usually columnar (mined extensively in Thomas and Davis region) | 5 to 8 | 8 |
| Shale, sandy, and fire clay, impure, **Bolivar** | 3 to 5 | 13 |
| Limestone, **Upper Freeport**, ferriferous, composed of two benches, separated by shale .................................. | 5 to 10 | 23 |
| Sandstone, **Upper Freeport**, gray, massive.. | 35 to 20 | 43 |
| **Coal, Lower Freeport**, double-bedded, lenticular... .................................. | 0 to 2 | 45 |
| Limestone, **Lower Freeport**, ferriferous nodules, mixed with plastic fire clay......... | 2 to 6 | 51 |
| Fire clay, **Lower Freeport**, flinty or plastic.. | 5 to 6 | 57 |
| Sandstone, **Lower Freeport**, shaly or massive .................................... | 30 to 20 | 77 |
| **Coal, Upper Kittanning**, soft, double-bedded, lenticular .............................. | 0 to 3 | 80 |
| Limestone, **Johnstown**, gray, shaly, lenticular .................................. | 0 to 3 | 83 |
| Fire clay, impure, or sandy shale.......... | 5 to 16 | 99 |
| **Coal, Middle Kittanning**, slaty, lenticular.. | 0 to 1 | 100 |
| Sandstone, **East Lynn**, shaly, or represented by sandy shale..................... | 5 to 11 | 111 |
| **Coal, Lower Kittanning**, multiple-bedded... | 1 to 4 | 115 |
| Fire clay, **Lower Kittanning**, flinty, lenticular .................................. | 0 to 4 | 119 |
| Sandstone, **Kittanning**, massive............ | 10 to 20 | 139 |
| **Coal, Clarion**, double-bedded.............. | 1 | 140 |
| Shale, dark or sandy...................... | 10 | 150 |
| Sandstone, **Homewood**, top of Pottsville Series ................................ | .. | ... |

## DESCRIPTION OF MEMBERS, ALLEGHENY SERIES.

### UPPER FREEPORT (DAVIS) COAL.

The **Upper Freeport Coal** is represented in Tucker County by a bed which has been known locally as the "Davis" Coal, and which has hitherto been correlated as the Lower

Kittanning. That this coal is not the Kittanning but belongs at the horizon of the Upper Freeport has been detailed in previous pages. As exposed in the Davis and Thomas region, where it is mined extensively, this coal is usually multiple-bedded, there being two principal benches, separated by a heavy shale parting which comes slightly below the middle. The upper bench, usually three to five feet thick, often has one, and less frequently two thin slate partings, and the lower bench, which is from two to three feet thick, sometimes contains a minor parting. This coal has been used as the basis of the structure contours of the Carboniferous region of the county and its outcrop has been delineated on Map II.

In the North Potomac Basin it outcrops in the valley of North Fork of Blackwater River below Coketon, generally rising southwestward. At the western rim of the basin it outcrops at the foot of Backbone Mountain, and on the eastern rim it is above drainage in the vicinity of Davis and in the valley of Beaver Creek. In the Stony River Syncline it outcrops at the southern edge of the plateau north of Laneville and at the bases of Cabin Mountain and the Alleghany Front on either limb of the basin. In Chapter XIII it will be discussed in full with numerous bed sections, chemical analyses, and an estimate of its areal extent and tonnage.

### BOLIVAR FIRE CLAY.

The **Bolivar Fire Clay,** belonging just below the Upper Freeport (Davis) Coal, is usually represented in Tucker by 3 to 5 feet of sandy shale, there being an impure stratum of fire clay under the coal. As an economic horizon it is of no probable value.

### UPPER FREEPORT LIMESTONE.

The **Upper Freeport Limestone,** coming a few feet below the Upper Freeport (Davis) Coal, and being of fresh-water origin, is visible on the east side of North Fork of Blackwater River, one-half mile below Coketon, where, as exhibited in the Douglas Section, page 126, it is composed of two thin benches of ferriferous limestone, separated by 3 to 10 feet of fire clay shale, the entire deposit being 12 feet thick.

On the west side of North Fork it is visible for a considerable distance along the Western Maryland Railway cut just below Coketon, its relationship to the coal being exhibited. It is visible again on the south side of Beaver Creek, 0.5 mile southwest of Gatzmer, where it is 3 feet thick, coming a few feet above the Lower Freeport Coal, as recorded under the description of Coal Exposure No. 68 on a subsequent page.

### UPPER FREEPORT SANDSTONE.

The **Upper Freeport Sandstone**, belonging just under the Upper Freeport Limestone and 15 to 20 feet below the Upper Freeport (Davis) Coal, is a generally persistent horizon throughout most of the outcrop of the Allegheny Series of Tucker County, being locally absent in some localities. As a rule it is massive, gray, coarse-grained, and sometimes conglomeratic, its thickness usually ranging from 20 to 35 feet, although in certain localities it assumes more massive proportions. In Chapter IV it is recorded in the sections for Laurel Run of Dry Fork, Backbone Mountain, Douglas, and Little Stonecoal Run of Red Creek. At the Backbone Mountain exposure it is a massive and a very pebbly ledge, forming the government triangulation point at the southern end of the mountain. At the head of Little Stonecoal Run of Red Creek, north of Laneville, it is a similar deposit, forming an isolated pinnacle known as the "Big Rocks." In conjunction with the Mahoning Sandstones, this ledge has evidently been a considerable factor in the preservation of many acres of valuable coal. In Chapter XIII it is recorded in coal test borings Nos. 12, 27, 44, 63, 82, and 83.

So far as known this ledge has not been quarried in the county but its massive and usually durable character would adapt it for rough structures where these qualities are essential, its position at any point along its horizon being apparent from the outcrop line of the Upper Freeport Coal on Map II.

### LOWER FREEPORT COAL.

The **Lower Freeport Coal,** belonging 40 to 50 feet below the Upper Freeport (Davis) seam, is but poorly developed in

Tucker County, being extremely lenticular, thin, slaty, and of no present economic value. It is usually double-bedded, with a thickness of two feet or less, when present in the measures. In Chapter IV its horizon is noted in the section for Douglas, being represented by black shale, and in that for Stonecoal Run of Red Creek, where it is 1½ feet thick with a slate parting. In Chapter XIII it is recorded in coal test borings Nos. 12, 42, and 46. The following exposure was noted at outcrop:

### Gatzmer Coal & Coke Company Prospect—No. 68 on Map II.

On south side of Beaver Creek, 0.5 mile southwest of Gatzmer; Lower Freeport Coal; elevation, 3145' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Limestone, hard, ferriferous, 0' 4" to.... | 1' 0" | Upper Freeport..... | 3 | 0 |
| Shale, hard............ | 1 0 | | | |
| Limestone, ferriferous. | 1 0 | | | |
| Sandstone, shaly, Upper Freeport................ | | | 4 | 0 |
| Shale, dark, cannel at base....................... | | | 2 | 0 |
| Coal, soft............ | 0' 10" | Lower Freeport.... | 2 | 0 |
| Coal, bony............ | 0 3 | | | |
| Coal, soft............. | 0 11 | | | |
| Fire clay shale to creek........................ | | | 2 | 0 |

#### LOWER FREEPORT LIMESTONE.

The **Lower Freeport Limestone,** coming just under the Lower Freeport Coal, and being of fresh-water origin, was observed on the east side of North Fork of Blackwater River, 0.4 mile northeast of Douglas. As recorded in the section for Douglas, page 126, it consists of ferriferous limestone nodules or boulders bedded in plastic fire clay, the entire deposit being 6 feet thick. Elsewhere in the county it was not noted, either at outcrop or in the records of borings.

#### LOWER FREEPORT FIRE CLAY.

The **Lower Freeport Fire Clay,** not previously named or described, is well exposed on the east side of North Fork of Blackwater River 0.4 mile northeast of Douglas, where, as recorded in the section for Douglas, page 126, it consists of one foot of flinty clay at the top, followed by five feet of plastic clay, its position in the measures being between the Lower

PLATE VII.—View from western slope of Canaan Mountain southeast of Davis looking across North Potomac Syncline toward Backbone Mountain which is faint ridge in left background. Pottsville boulders in foreground and town of Davis in middle. Destructive effect of forest fires is evident.

Freeport Limestone and the Lower Freeport Sandstone, and its name being given from its stratigraphic associations. A sample (No. 458R) collected at this point from both benches of the clay on the lands of the West Virginia Central and Pittsburgh Railway, shows the following analysis according to Hite and Krak:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 62.45 |
| Ferric Iron ($Fe_2O_3$) | 3.98 |
| Alumina ($Al_2O_3$) | 21.40 |
| Lime (CaO) | 0.40 |
| Magnesia (MgO) | 0.83 |
| Potassium Oxide ($K_2O$) | 3.15 |
| Sodium Oxide ($Na_2O$) | 0.63 |
| Titanium Oxide ($TiO_2$) | 0.53 |
| Phosphoric Acid ($P_2O_5$) | 0.09 |
| Moisture | 1.36 |
| Loss on ignition | 5.70 |
| Total | 100.52 |

The analysis of the above clay indicates that it is of a semi-refractory nature. It would probably burn to a yellow or buff color and should be suitable for paving brick, earthenware, or sewer tile. Its outcrop is convenient, and if borings should prove the deposit extensive, its exploitation might be profitable.

### LOWER FREEPORT SANDSTONE.

The **Lower Freeport Sandstone,** coming between the Lower Freeport Fire Clay and the Upper Kittanning Coal, is generally present in the Allegheny Series of Tucker County. As a rule it is gray, coarse-grained, hard, and massive, or sometimes shaly, its thickness ranging from 5 to 50 feet, but usually being 20 to 30 feet. In Chapter IV it is noted in the sections for Douglas, Little Stonecoal Run, Big Stonecoal Run, and Red Creek, and in Chapter XIII it is recorded in coal test borings Nos. 27 and 82.

No quarries were observed at this horizon, but it could be used for rough building stone at various localities. Its base comes about 75 feet below the Upper Freeport Coal, the contours and outcrop of which, as recorded on Map II, would aid in its identification.

## UPPER KITTANNING COAL.

The **Upper Kittanning Coal,** coming just below the Lower Freeport Sandstone, and at an interval of 70 to 90 feet below the Upper Freeport (Davis) Coal, is but poorly represented in Tucker County. As a rule it is double-bedded, with a thin black slate near the middle, the thickness of the entire bed varying from 1 to 3 feet. In Chapter IV it is recorded in the sections for Douglas, Stonecoal Run of Red Creek, and Red Creek, and in Chapter XIII it is noted in coal test borings Nos. 16, 30, 37, 41, 44, 46, and 63. Its best development at outcrop appears to be in the valley of North Fork of Blackwater River between Coketon and Douglas where it reaches a maximum of two or three feet.

As an economic horizon it has no present commercial value but at some future date when the thicker coals have been exhausted it may furnish a small tonnage in the region named above. The following exposures and prospects were noted:

### Cumberland Coal Company Prospect—No. 69 on Map II.

On west side of North Fork, 0.9 mile southwest of Douglas; Upper Kittanning Coal; elevation, 3025′ B.

| | | Ft. | In. |
|---|---|---|---|
| Slate, black, roof | | | |
| Coal | 0′ 8″ | | |
| Shale, gray | 0 2 | | |
| Coal | 1 5 | 2 | 3 |
| Fire clay shale, with ferriferous limestone, Johnstown, to old railroad grade | | 10 | 0 |

### Cumberland Coal Company Exposure—No. 70 on Map II.

On west side of North Fork, 0.6 mile southwest of Douglas; Upper Kittanning Coal; elevation, 2960′ B.

| | Ft. | In. |
|---|---|---|
| Shale, gray | | |
| Coal | 0 | 9 |
| Shale, pavement | | |

### Cumberland Coal Company Prospect—No. 71 on Map II.

On west side of North Fork, 0.3 mile south of Douglas; Upper Kittanning Coal; elevation, 2905′ B.

| | Ft. | In. |
|---|---|---|
| Coal, visible | 1 | 0 |

## Cumberland Coal Company Exposure—No. 72 on Map II.

On east side of North Fork, just east of Douglas; **Upper Kittanning Coal**; elevation, 2875' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Slate, sandy | | | | |
| **Coal** | 0' | 8" | | |
| Slate | 0 | 1 | | |
| **Coal** | 2 | 0 | 2 | 9 |

## West Virginia Central & Pittsburgh Railway Exposure—No. 73 on Map II.

On east side of North Fork, 0.5 mile northeast of Douglas; **Upper Kittanning Coal**; elevation, 2850' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Shale, sandy | | | | |
| 2. **Coal** | 0' | 10" | | |
| 3. Shale, gray | 0 | 3 | | |
| 4. **Coal** | 0 | 8 | | |
| 5. Slate, dark | 0 | 1 | | |
| 6. **Coal** | 1 | 0 | 2 | 10 |
| 7. Fire clay, slaty | | | | |

A sample (No. 459R) was collected from Nos. 2, 4, and 6 of section, the analysis of which is published under **Mine No. 73** in the Table of Coal Analyses of the end of Chapter XIII. The analysis reveals a high content of sulphur and ash.

## Robert Bridges Heirs Prospect—No. 74 on Map II.

On Red Creek, 0.3 mile above Left Fork and 5 miles northeast of Laneville; **Upper Kittanning Coal**; elevation, 3540' B.

| | Ft. | In. |
|---|---|---|
| Sandstone, shaly | | |
| **Coal**, soft | 0 | 10 |
| Shale, black, hard | 0 | 2 |

### JOHNSTOWN LIMESTONE.

The **Johnstown Limestone**, coming just under the Upper Kittanning Coal, is present in the valley of North Fork of Blackwater River where the best opportunity for study of the Allegheny sediments is afforded. In this region it is a gray, shaly stratum, of fresh-water origin, its thickness varying from 1 to 3 feet. In the section for Douglas, page 126, its presence is noted on the east side of North Fork, one-half mile below Coketon, its outcrop being visible below the Upper Kittanning Coal. A sample (No. 460R), collected at this point on the lands of the West Virginia Central and Pittsburgh Railway, shows the following analysis, according to Hite and Krak:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 23.30 |
| Ferric Iron ($Fe_2O_3$) | 2.78 |
| Alumina ($Al_2O_3$) | 9.98 |
| Calcium Carbonate ($CaCO_3$) | 57.05 |
| Magnesium Carbonate ($MgCO_3$) | 2.31 |
| Phosphoric Acid ($P_2O_5$) | 0.24 |
| Loss on ignition | 3.74 |
| Total | 99.40 |

In composition the above limestone approaches natural cement but the thin nature of the deposit precludes its use for any such purpose.

This limestone is again visible on the west side of North Fork, 0.9 mile southwest of Douglas, as detailed under the description of coal prospect No. 69, page 186. In Chapter XIII it is also recorded in coal test boring No. 50 where it is 2 feet thick. As an economic horizon its principal value is that of soil enrichment along its local outcrop.

## MIDDLE KITTANNING COAL.

The **Middle Kittanning Coal**, coming a few feet under the Johnstown Limestone, from which it is usually separated by 5 to 15 feet of impure fire clay or sandy shale, and about 20 feet below the Upper Kittanning Coal, is but poorly represented in Tucker County. In the section for Douglas, page 126, it is recorded as being one foot thick and slaty, with a streak of bone at the middle, its position on Map II being listed as **Coal Exposure No. 75**. Inasmuch as it was not obobserved elsewhere in the county it may be considered as of no economic value.

### EAST LYNN SANDSTONE.

The **East Lynn Sandstone**, coming between the Middle and Lower Kittanning Coals, is but poorly represented in Tucker County, its principal region of development being in the central and southwestern portion of the State. Along the valley of North Fork where its horizon is exposed, it is represented only by lenticular streaks of sandstone and sandy shale, the entire interval between the two coals being only 17 feet. In Chapter XIII it is noted in the records of coal test borings Nos. 41 and 44.

### LOWER KITTANNING COAL.

The **Lower Kittanning Coal**, which in many of the northern counties of West Virginia is a thick bed of valuable fuel, is but poorly represented in Tucker, having apparently suffered in the general decadence of the Kittanning stage in that region. In the North Potomac Basin, where it was observed at several points, it is a multiple-bedded seam, with several slate or shale partings, its thickness varying from 1 to 5 feet, and its interval below the Upper Freeport (Davis) Coal being from 120 to 140 feet. It may furnish a small amount of local domestic fuel but its lenticular nature and numerous partings as well as its high content of ash would seem to make its commercial exploitation unprofitable. In Chapter IV its position is noted in the sections for Laurel Run of Dry Fork and Douglas, and in Chapter XIII it is recorded in coal test borings Nos. 27, 41, and 44. The following exposure and prospects were noted:

#### Dobbin Manor Prospect—No. 76 on Map II.

On south side of Laurel Run of Dry Fork River, 1.7 miles northeast of Otter; **Lower Kittanning Coal**; elevation, 3180′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Soil | | | | |
| 2. | **Coal**, measured 3′ 0″, reported | 4′ | 0″ | | |
| 3. | Slate, black | 0 | 4 | | |
| 4. | **Coal** | 0 | 4 | 4 | 8 |
| 5. | Slate, pavement | | | | |

A sample (No. 429R) was collected at outcrop from No. 2

of section, the composition of which is published under **Mine No. 76** in Table of Coal Analyses at the end of Chapter XIII. The analysis reveals an extremely high content of ash, some of which is no doubt due to the weathered condition of the sample.

### Babcock Lumber & Boom Company Mine—(Dobbin Manor Tract)—No. 77 on Map II.

On Canaan Mountain, south of Blackwater River and 3.3 miles eastward from Hendricks; **Lower Kittanning Coal**; elevation, 3165' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. | Slate, black | | | |
| 2. | **Coal** | | 0 | 2 |
| 3. | Shale, dark | | 2 | 0 |
| 4. | **Coal** | | 0 | 5 |
| 5. | Fire clay, flinty, **Canaan Mountain** | | 5 | 0 |
| 6. | **Coal**, soft | 1' 10" | | |
| 7. | Slate, black | 0 4 | | |
| 8. | **Coal**, soft | 0 6 | | |
| 9. | **Coal**, slaty | 0 5 | 3 | 1 |
| 10. | Shale, gray, pavement, and concealed to **Homewood Sandstone** | | 10 | 0 |

At the above point a tipple was once erected by the Babcock Lumber and Boom Company, and the coal was mined for a time for use on the logging locomotives of the company, but the operation has been abandoned for many years and the mine has fallen shut. A sample (No. 430R) was collected from Nos. 6 and 8 of section at the entrance, the composition of which is published under **Mine No. 77** in the Table of Coal Analyses at the end of Chapter XIII. Its analysis reveals a medium-volatile coal somewhat high in ash.

At the same point a sample (No. 431R) was collected from the flint fire clay (No. 5 of section) just above the coal, the composition of which is reported as follows by Hite and Krak:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 57.15 |
| Ferric Iron ($Fe_2O_3$) | 2.74 |
| Alumina ($Al_2O_3$) | 23.62 |
| Lime ($CaO$) | 2.70 |
| Magnesia ($MgO$) | 0.54 |
| Potassium ($K_2O$) | 2.23 |
| Sodium ($Na_2O$) | 0.45 |
| Titanium ($TiO_2$) | 0.80 |
| Phosphoric Acid ($P_2O_5$) | 0.09 |
| Moisture | 1.29 |
| Loss on ignition | 7.69 |
| Total | 99.20 |

The above analysis reveals a clay that would probably burn to a yellow or light-buff color, but its lime content is too high to class it as refractory. It should make a good grade of paving brick or sewer tile but its isolated position on the top of Canaan Mountain would make its exploitation expensive. As a matter of record it might be termed the **Canaan Mountain Fire Clay.**

Since field work was completed in the county some extensive slides have occurred in the valley of North Fork of Blackwater River, at one of which Mr. J. A. Smith, Chief Engineer, Cumberland Coal Company, of Douglas, West Virginia, has measured the following section, showing almost the entire Kittanning stage, the locality being on the west side of North Fork, just above its mouth:

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Bottom of **Davis (Upper Freeport) Coal** | ... .. | ... .. |
| Fire clay and concealed | 63 10 | 63 10 |
| Shale, gray | 2 0 | 65 10 |
| **Coal** 0' 9" / Shale 0 0¼ / **Coal** 1 4¾ } **Upper Kittanning** | 2 2 | 68 0 |
| Limestone, Johnstown | 2 0 | 70 0 |
| Shales | 9 0 | 79 0 |
| Concealed | 53 0 | 132 0 |
| Shale, yellow | 2 2 | 134 2 |
| **Coal, Middle Kittanning** | 0 10 | 135 0 |
| Shale, black, coaly | 1 0 | 136 0 |
| Concealed (gray shale?) | 10 0 | 146 0 |
| Shale, black, coaly | 2 5 | 148 5 |
| **Coal** 1' 6" / Shale 0 3 / **Coal** 0 6 / Shale 0 2 / **Coal** 1 2 } **Lower Kittanning** | 3 7 | 152 0 |
| Shale, black, coaly | 1 6 | 153 6 |
| Shales | 40 0 | 193 6 |
| Sandstone, massive (**Homewood**) | ... .. | ... .. |

At the following locality, which is on the west side of North Fork, about one-third mile south of Douglas, the Lower Kittanning is again uncovered by a slide, its elevation, according to Mr. Smith, being 2,821 feet, and the interval from its base to that of the Upper Freeport (Davis) Coal being 164 feet, and a measurement at the outcrop being as follows:

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, roof | | | | |
| Coal | 1' | 8" | | |
| Shale | 0 | 3 | | |
| Coal | 0 | 7 | | |
| Shale | 0 | 1 | | |
| Coal | 0 | 9 | | |
| Shale | 0 | 2 | | |
| Coal | 3 | 4 | | |
| Shale | 2 | 0 | | |
| Coal | 1 | 4 | 10 | 2 |
| Fire clay shale, pavement | | | | |

A heading was driven into the coal for a considerable distance but it thinned down to three or four feet, causing it to be abandoned.

The two following exposures were noted by the writer farther up North Fork:

### Cumberland Coal Company Exposure—No. 78 on Map II.

On east side of North Fork, 0.2 mile southeast of Douglas; Lower Kittanning Coal; elevation, 2862' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, sandy | | | | |
| Coal | 0' | 3" | | |
| Shale | 0 | 3 | | |
| Coal | 0 | 4 | 0 | 10 |
| Shale, sandy | | | | |

### Cumberland Coal Company Exposure—No. 79 on Map II.

On east side of North Fork, 0.2 mile northeast of Douglas; Lower Kittanning Coal; elevation, 2830' B.

| | Ft. | In. |
|---|---|---|
| Shale, sandy | | |
| Coal | 1 | 6 |
| Fire clay, flinty, Lower Kittanning | 5 | 0 |
| Concealed to Homewood Sandstone | 20 | 0 |

#### LOWER KITTANNING FIRE CLAY.

The **Lower Kittanning Fire Clay**, belonging just under the Lower Kittanning Coal, and being a valuable deposit at some localities in northern West Virginia, appears to be represented in Tucker mainly by sandy shale. At **Coal Exposure No. 79**, on the east side of North Fork, 0.2 mile northeast of Douglas, however, there is 5 feet of flinty clay exposed at this horizon. The absence of pure fire clay at other exposures of this stage leads to the belief that its occurrence in the county is sporadic and lenticular.

The **Vanport (Ferriferous) Limestone,** belonging just under the Lower Kittanning Fire Clay, and bearing marine fossils in certain regions of Pennsylvania and Ohio, was not observed in Tucker. Dr. Swartz and his associates[2] state that this stratum extends only a few miles east of Pittsburgh.

### KITTANNING SANDSTONE.

The **Kittanning Sandstone,** belonging just over the Clarion Coal, appears to be represented at various localities in Tucker. In the section for Douglas, page 126, it is recorded as 22 feet thick, and massive, and in Chapter XIII, it is noted in coal test borings Nos. 28, 30, and 63, its thickness varying from 5 to 35 feet. Only a few borings have pierced its horizon and it possibly occurs throughout a considerable portion of the Allegheny deposits. This ledge has often been classified as the Clarion Sandstone in various County Reports of the State Survey but the name Kittanning is older and deserves precedence.

### CLARION COAL.

The **Clarion Coal,** coming just under the Kittanning Sandstone, and approximately 140 feet below the Upper Freeport (Davis) Coal in Tucker County, appears to be lenticular in its occurrence, being double-bedded and seldom more than one foot in thickness, and worthless from an economic standpoint. In Chapter IV its position is recorded in the section for Douglas, page 127, and in Chapter XIII it is noted in coal test borings Nos. 30, 41, and 63. The following exposures were noted:

Cumberland Coal Company Exposure—No. 80 on Map II.

North of Blackwater River, 1.3 miles southwest of Douglas; Clarion Coal; elevation, 3010' B.

| | Ft. | In. |
|---|---|---|
| Coal, visible | 1 | 0 |
| Fire clay shale | 5 | 0 |
| Sandstone, massive, pebbly, cliff rock, Homewood.. | | |

[2] C. K. Swartz, W. A. Price, and H. Bassler, Bull. Geol. Soc. Am., Vol. 30, p. 591; 1919.

## Coal Blossom—No. 81 on Map II.

East of North Fork, 0.5 mile southeast of Douglas; **Clarion Coal**; elevation, 2870′ B.

| | Ft. | In. |
|---|---|---|
| Slate and **coal blossom** | ... | .... |
| Concealed, with shale | 10 | 0 |
| Sandstone, massive, pebbly, **Homewood** | | |

## Cumberland Coal Company Exposure—No. 82 on Map II.

East of North Fork, 0.3 mile southeast of Douglas; **Clarion Coal**: elevation, 2855′ B.

Section south of Long Run and west of North Fork.

| | | Ft. | In. |
|---|---|---|---|
| Soil | | ... | ... |
| **Coal** | 0′ 8″ | | |
| Shale, gray | 0 7 | | |
| **Coal** | 0 6 | 1 | 9 |
| Fire clay and concealed to **Homewood Sandstone** | | 5 | 0 |

## Cumberland Coal Company Exposure—No. 83 on Map II.

East of North Fork, 0.2 mile southeast of Douglas; **Clarion Coal**; elevation, 2835′ B.

| | | Ft. | In. |
|---|---|---|---|
| Sandstone, **Kittanning** | | | |
| **Coal** | 0′ 5″ | | |
| Shale, dark | 0 4 | | |
| **Coal** | 0 3 | 1 | 0 |
| Shale, dark, sandy, to **Homewood Sandstone** | | 10 | 0 |

The **Clarion Fire Clay**, coming immediately below the Clarion Coal in western Pennsylvania, appears to be represented in Tucker by sandy or dark shales, no pure clay having been observed at its horizon.

# CHAPTER VII.

## STRATIGRAPHY--POTTSVILLE SERIES.

### GENERAL ACCOUNT AND SECTION, POTTSVILLE SERIES.

The Pottsville Series was first named and described by Pennsylvania geologists from its occurrence at Pottsville, eastern Pennsylvania, where it has numerous beds of conglomeratic sandstones, separated by anthracite coal seams and shales. Later it was subdivided by Dr. I. C. White into the the Upper Pottsville, or Kanawha Group, the Middle Pottsville, or New River Group, and the Lower Pottsville, or Pocahontas Group. Of these titles custom has sanctioned the use of the geographic names last mentioned, on account of the close application of the Kanawha and New River to the coal fields of southern West Virginia, and of the Pocahontas to the field of that name in southwestern Virginia and southern West Virginia, and for that reason they will be used exclusively in this Report. Of the above-named groups the Pottsville Series is represented in Tucker County entirely by the Kanawha and New River, no vestige of the Pocahontas, which is distinctively a southern phase, being present. As outlined on Map II the Pottsville covers a large portion of the eastern half of the county, its outcrop forming the main western escarpments of Backbone, Green, and McGowan Mountains, which lie mainly west of the North Potomac Syncline, and also forming a wide belt between the syncline named and the Blackwater Anticline in the broad summits of Canaan and Brown Mountains. Farther east on the two flanks of the Stony River Syncline, it forms the western escarpment of Cabin Mountain and the eastern escarpment of the Alleghany Front.

Along the axes of the North Potomac Syncline north of Blackwater River and of the Stony River Syncline north of Red Creek its sediments occur beneath more recent strata.

The following general section has been compiled to show the full development of the Pottsville in Tucker. By way of introduction it may be said that Tucker occupies a position far northeast of the region of maximum development. At the Virginia State Line, adjoining McDowell County, the Kanawha Group exhibits a maximum thickness of 2,100 feet, the New River Group a maximum of 1,030 feet, and the Pocahontas Group a maximum of 720 feet, making a total of 3,850 feet for the Pottsville sediments. In contrast with these figures the general section for Tucker shows a maximum of 385 feet for the Kanawha, and 275 feet for the New River, no Pocahontas being present, making a total of 660 feet for the entire Pottsville, or slightly more than one-sixth of the maximum development of southern West Virginia. Reduced to decimals the Kanawha Group of Tucker is only 18 per cent. of the McDowell County maximum, and the New River less than 27 per cent., the figure for the entire Pottsville being 17 per cent. It is thus apparent that only a few of the important coals, sandstones, and fossiliferous limestones and shales of the Pottsville of southern West Virginia are well represented in Tucker, the remainder being thin or absent.

Comparing the Pottsville of Tucker, on the other hand, with the same series in eastern Monongalia and other northern counties of the State where it first outcrops east of the Appalachian Geosyncline, the general section of the series for this portion of the State, as compiled by Ray V. Hennen, shows only 300 feet, no division being made between the Kanawha and New River Groups, although certain of the lower members evidently belong in the latter. This thickness, as compared to the total of 660 feet for both groups in Tucker, is only 45 per cent. It is thus apparent again that Tucker lies in a zone where the rapid southwestward expansion of the series has begun and where many problems of nomenclature face the geologist who attempts its correlation.

Owing to the fact that geologic study of the Pottsville was first begun in Pennsylvania, followed by an almost entirely distinct classification in southern West Virginia in the region of maximum thickness, with a nomenclature of its own made necessary because of the fact that none of the Pennsylvania members had then been definitely traced through the central counties of West Virginia, it has been necessary in the present volume to employ two distinct titles for several important horizons the identity of which now seems subject to little further doubt. Precedence is given mainly to the Pennsylvania nomenclature, but certain of the lower members which have been traced continuously from the coal fields of southern West Virginia, leaving little doubt of their correlation, have been assigned the southern titles with suggested parenthetical Pennsylvania names.

In the general section for the county only such members are included as have been definitely observed. It is quite possible and probable that others may be discovered by future investigators, and if such be the case their correlation should be based on general sections for the series published in counties farther southwest where more members have been identified.

By referring to the measured sections of Chapter IV it will be noted that many of the various Pottsville sandstone ledges frequently have a much greater thickness than the maximum assigned to them in the general section, this apparent discrepancy being due to the fact that the individual members frequently develop local thick lenses, usually compensated by a corresponding thinning of other members above or below. To have incorporated these excessive thicknesses in the general section would have distorted the prevailing intervals between important coals or other stratigraphic horizons.

The general section of the county, as compiled from the measured sections of Chapter IV, supplemented by many other detailed observations, is as follows:

## General Section of the Pottsville Series for Tucker County.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Kanawha Group (385′) | | |
| Sandstone, Homewood, massive, gray, pebbly, prominent in Backbone, Green, McGowan, Canaan, Mozark, and Cabin Mountains | 50 to 95 | 95 |
| Fire clay, Hammond, plastic | 1 to 4 | 99 |
| Coal, Upper Mercer, multiple-bedded, lenticular | 5 to 1 | 100 |
| Shales, dark or sandy, horizons of Kanawha Black Flint and Lower Mercer (Stockton) Coal, not recognized in county | 10 to 25 | 125 |
| Sandstone, Upper Connoquenessing, massive, gray, pebbly, outcrop general in same region as Homewood | 100 to 75 | 200 |
| Coal, Quakertown "Rider", lenticular | 0 to 1 | 201 |
| Shale, Quakertown, black, fissile, often carrying Naiadites fossils | 5 to 7 | 208 |
| Coal, Quakertown (Winifrede?), double-bedded, soft, lenticular | 0 to 2 | 210 |
| Shales, dark, argillaceous or sandy | 5 to 20 | 230 |
| Limestone, Winifrede, represented by dark fissile shale which carries Lingula fossils on Otter Creek | 5 to 10 | 240 |
| Shales, dark or sandy, with streaks of coal (Williamson?) | 20 to 50 | 290 |
| Shale and limestone, Blackwater (Dingess?), dark, fissile shale with ferruginous limestone at base, both carrying marine fossils in gorge of Blackwater below falls | 15 | 305 |
| Shales, dark or sandy | 5 to 10 | 315 |
| Sandstone, Lower Gilbert, gray, massive, medium-coarse, generally present | 25 to 50 | 365 |
| Shale, Gilbert, dark, laminated | 5 to 8 | 373 |
| Coal, Gilbert, soft, single-bedded | 1 to 2 | 375 |
| Shales, sandy, or dark | 5 to 10 | 385 |
| New River Group (275′) | | |
| Sandstone, Upper and Lower Nuttall, gray, massive, sometimes pebbly | 50 to 75 | 460 |
| Shale, Upper Iaeger, dark, sandy | 5 to 13 | 473 |
| Coal, Hughes Ferry | 0½ to 2 | 475 |
| Shales, Lower Iaeger and Sandy Huff, dark, occasionally ferruginous | 10 to 24 | 499 |
| Coal, Castle, lenticular | 0 to 1 | 500 |
| Sandstones, Guyandot and Lower Guyandot, gray, massive, usually form one ledge but sometimes separated by an interval containing Skelt Shale and Sewell "B" Coal | 50 to 25 | 525 |
| Shale, Hartridge, black, fissile, contains fossils near Laneville | 20 to 5 | 530 |
| Coal, Sewell (Sharon?) | 1 to 5 | 535 |
| Sandstone, Welch, massive | 20 to 29 | 564 |
| Coal, Welch, lenticular | 0 to 1 | 565 |

| | Thickness. Feet. | Total Feet. |
|---|---|---|
| **Sandstone, Upper Raleigh** (**Sharon?**), gray massive, frequently pebbly..... ......... | 25 to 70 | 635 |
| **Coal, Fire Creek,** double-bedded, lenticular.. | 0 to 5 | 640 |
| **Sandstone, Pineville,** lenticular............. | 0 to 20 | 660 |
| Shales, red or green, top of **Mauch Chunk Series** ................................. | .. .. | ... |

Lithologically the series contains approximately 66.5 per cent. of sandstone, 30.5 per cent. of shale and fire clay (with included limestone), and 3 per cent. of coal.

## GENERAL DESCRIPTION, KANAWHA GROUP OF POTTSVILLE.

The Kanawha Group of the Pottsville Series is characterized in Tucker County by a 200-foot stage of nearly continuous, conglomeratic sandstone, coming at the top of the group, followed by 150 to 175 feet of softer, shaly sediments, in which fossils of marine or brackish-water origin occur in sparing quantity, succeeded near the base by another persistent sandstone stage, 25 to 50 feet in thickness. Several coals are found at various levels, all of which are too thin, lenticular or impure to be of any present commercial value. Limestone is almost totally absent, the prevailing sediments between the various sandstone ledges being dark or sandy shales. Owing to the heavy conglomerates at the top of the group, an extremely rugged and rock-strewn topography follows its outcrop throughout the county. The total thickness of the group, as shown by the general section of the Pottsville on a previous page, is approximately 385 feet.

## DESCRIPTION OF MEMBERS, KANAWHA GROUP OF POTTSVILLE.

### HOMEWOOD SANDSTONE.

The **Homewood Sandstone,** coming at the top of the Kanawha Group, is a massive, gray, pebbly stratum, varying in thickness from 50 to 125 feet, and being very persistent throughout the outcrop of the Pottsville in the county. Along the axis of the North Potomac Basin it rises above drainage on North Fork of Blackwater River at Douglas, below which it forms a series of low cataracts and toward the mouth of the fork makes a series of heavy cliffs at the brow of the mountains on either side of the stream. From the mouth of North Fork southwestward down Blackwater River its outcrop is conspicuous for several miles, its top forming the edge of the plateau on either side. North of the Blackwater it outcrops continuously on the eastern slope of Backbone Mountain northeastward to the Tucker-Preston County Line. Along the same basin southwest of Blackwater River, its outcrop is conspicuous at the edge of the table-land rim of Green Mountain and on McGowan Mountain it make numerous bold escarpments, the Government triangulation point, now used as a fire lookout station, one mile south of Hendricks, having been built on one of the promontories.

On Blackwater River above North Fork its outcrop continues at the edge of the plateau on either side for several miles. Just above Davis it begins to rise rapidly toward the Blackwater Anticline until it reaches the summits of Brown and Canaan Mountains, beyond which its horizon is generally eroded along the axis of the arch except on the headwaters of Beaver Creek where the northeastward pitch of the measures brings it down toward drainage.

In the Stony River Basin it is prominent in the plateau north of Laneville and outcrops on the eastern slope of Cabin Mountain and on the western side of the Alleghany Front. In Randolph County, just south of Laneville, it forms the summit of the Alleghany Front, the Red Creek and Roaring Plains being on its nearly bare top.

In Chapter IV the Homewood is noted in the sections for Hendricks, Laurel Run of Dry Fork, Backbone Mountain, Douglas, Blackwater Falls, Davis, Otter Creek, Laneville, Little Stonecoal Run, Stonecoal Run, and Red Creek. In Chapter XIII it is recorded in coal test borings Nos. 30 and 44, few holes having pierced its horizon.

As an economic horizon it is of small apparent value, its principal function being as a physiographic factor in preserving from erosion many of the high plateaus of the county. It

PLATE VIII.—Looking northeast from road on Canaan Mountain across anticlinal Canaan Valley toward Cabin Mountain. Ledge of Pottsville visible at left foreground followed by Mauch Chunk slope with Mauch Chunk and Greenbrier in flat valley. Low ridge in middle is Pocono. Cabin Mountain at rear is capped by Pottsville.

has a high content of silica but its usually conglomeratic nature precludes its general use as glass-sand, the quartz pebbles being considered objectionable by the trade, owing to the high temperature required to melt them.

At the **Babcock Lumber & Boom Company Quarry,** located on the old lumber railroad grade south of Blackwater River and 1 mile southwest of Davis, the Homewood Sandstone has been quarried for building purposes, the product having been used for local construction at Davis. At this point the stone is very coarse, but durable and practically free from pebbles, gray in color and having irregular joint- and cleavage-planes. The top of the ledge has an elevation of 3090′ B., the quarry face being 100 feet long and extending 30 feet into the hill, only 20 to 30 feet of the upper portion having been used. A sample (No. 450R) collected at the quarry shows the following analysis, according to Hite and Krak:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 98.64 |
| Ferric Iron ($Fe_2O_3$) | 0.21 |
| Alumina ($Al_2O_3$) | 0.59 |
| Calcium Carbonate ($CaCO_3$) | 0.02 |
| Magnesium Carbonate ($MgCO_3$) | Trace |
| Loss on ignition | 0.54 |
| Total | 100.00 |

It will be noted from the above analysis that the sample is nearly free from alumina, calcium, and magnesium, and the iron content is so low that it would seem probable that most of it, as well as some of the alumina, could be removed by washing. In any case a furnace test of the sand for green bottle or window glass making purposes would seem justifiable, as the locality is favorable for quarrying, there being little cover and the railroad grade and most of the trackage being available.

## HAMMOND FIRE CLAY.

The **Hammond Fire Clay,** coming between the Homewood Sandstone and the Upper Mercer Coal, and being just above the latter horizon at the type locality of the clay in

Marion County, is apparently represented in Tucker County at **Coal Opening No. 85** on the south side of Blackwater River and just east of the Babcock Lumber Mill at Davis, where there is 1 to 3 feet of plastic fire clay exposed between the Homewood and Upper Mercer, as is indicated in the description of the coal on a subsequent page. The same clay is visible again along the old Babcock railroad grade, at an elevation of 3140′ B., one-half mile southeast of the mouth of North Fork, its full thickness not being exposed. Elsewhere in the county it was not observed. It is possible that this clay horizon represents the Mount Savage instead of the Hammond horizon, or possibly a combination of the two, the intervening sandy shales with iron ore and streaks of coal which characterize their occurrence in Marion County having thinned away. In some portions of Tucker County the Mercer stage, coming between the Homewood and Upper Connoquenessing Sandstones, has been almost entirely wedged out by the two massive ledges, making individual correlations uncertain.

### UPPER MERCER COAL.

The **Upper Mercer Coal,** belonging in the interval between the Homewood and Upper Connoquenessing Sandstones and just under the Hammond Fire Clay, appears to be represented in Tucker by a multiple-bedded, lenticular seam that is present in a few localities. In Chapter IV it is noted in the sections for Douglas and Red Creek, its horizon being indicated by coal or coaly slate, and in Chapter XIII it is recorded in coal test borings Nos. 44 and 63. As a commercial coal its occurrence seems too sporadic to allow its classification as a valuable deposit but in a few localities it may furnish a small amount of local fuel. The following openings and exposures were noted:

#### Coal Exposure—No. 84 on Map II.

On Blackwater River, 1 mile southwest of Douglas and 0.3 mile northwest of mouth of North Fork; **Upper Mercer Coal**; elevation, 2864′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, massive, **Homewood**.................... | .. | .. |
| Slate, black, and **coal,** with plant fossils........... | 1 | 0 |
| Sandstone, massive, **Upper Connoquenessing**....... | | |

## Babcock Lumber & Boom Company Mine—No. 85 on Map II.

On south side of Blackwater River at Davis; **Upper Mercer Coal**; elevation, 3035′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. | Sandstone, massive, pebbly, **Homewood** | | 30 | 0 |
| 2. | Fire clay, plastic, **Hammond**, 1′ to | | 3 | 0 |
| 3. | **Coal** | 1′ 3″ | | |
| 4. | Shale, dark, 0′ 1″ to | 0 2 | | |
| 5. | **Coal**, good | 0 11 | | |
| 6. | **Coal**, bony | 0 3 | | |
| 7. | Shale, gray, with streaks of **coal** | 1 3 | | |
| 8. | **Coal**, good | 1 3 | 5 | 1 |
| 9. | Shale, pavement | | | |

A sample (No. 449R) was collected from Nos. 3, 5, and 8 of section, the composition of which is published under **Mine No. 85** in the Table of Coal Analyses at the end of Chapter XIII, the coal being unusually high in ash, sulphur, and phosphorus. An attempt was once made to mine it on a small scale but the opening has been abandoned.

The **Kanawha Black Flint** horizon, belonging between the Homewood and Upper Connoquenessing Sandstones and only a few feet below the Upper Mercer Coal and just above the Stockton (Lower Mercer) Coal, and having its best development in the Great Kanawha Valley of West Virginia, where it often carries an abundant marine fauna, was not identified with certainty in Tucker County. In the sections for Davis, page 133, and Red Creek, page 144, its horizon appears to be represented by dark, sandy shale, no fossils having been observed. This member has been definitely recognized as far northeast as southern Upshur County, where it is fossiliferous, and an exposure of marine shale on the western slope of Laurel Ridge in eastern Barbour has been doubtfully attributed to the same horizon. As indicated in previous publications of the Survey, the Flint horizon apparently correlates with the fossiliferous Mercer Limestone of western Pennsylvania. It is possible that an intensive search might reveal its fossils in Tucker but such a find seems doubtful, owing to the thinning of the Mercer stage, as already mentioned.

The **Stockton (Lower Mercer) Coal**, belonging just below the Kanawha Black Flint horizon and only a few feet above the top of the Upper Connoquenessing Sandstone, does not appear to be represented in Tucker having evidently been crowded out by the heavy sandstones above and below it. In Chapter XIII it is recorded in coal test boring No. 44, located in Grant County on a branch of the Potomac River near Fairfax Knob. In this boring the coal is 3′ 3″ thick, with some slate and bone, probably being a lenticular deposit.

### UPPER CONNOQUENESSING SANDSTONE.

The **Upper Connoquenessing Sandstone**, coming 5 to 25 feet below the Homewood Sandstone, from which it is usually separated by dark or sandy shale with occasional coal or fire clay, as detailed above, is a widely persistent stratum in the Pottsville sediments of the county. As a rule it is massive, gray, pebbly, and 75 to 100 feet thick, often forming huge cliffs. Its outcrop closely follows the regions outlined for the Homewood, the two cliffs being often noticeable in the same locality. On North Fork of Blackwater River it comes above drainage about one-third mile below Douglas, forming a cataract in the stream, and cliffs on either side in conjunction with the Homewood, with which it almost coalesces into one ledge. On Blackwater River it is prominent both above and below the mouth of North Fork, and at the Blackwater Falls the river makes a cataract, 57 feet high, over its middle portion, there being a total thickness of 112 feet exposed, as recorded in the section for that point, page 132. From the falls up-stream to Davis the ledge is under drainage, but beyond Davis the southeastward rise of the rocks brings it up again and it forms many of the rugged cliffs that may be seen on Brown and Canaan Mountains.

Along the road which leads from Davis to the Canaan Valley, 2.3 miles southeast of the town, it has weathered to such an extent at the **A. Thompson Quarry** that it is shoveled out in large quantities and hauled to Davis for concrete and general building purposes, some of the more resistant portions being blasted, according to W. E. Weimer who operates the quarry.

In Chapter IV its thickness and stratigraphic position are noted in the sections for Parsons, Hendricks, Douglas, Blackwater Falls, Davis, Otter Creek, Laneville, and Red Creek, and in Chapter XIII it is recorded in coal test borings Nos. 41 and 44, few others having been drilled through its horizon.

An an economic deposit it is probably high enough in silica for glass-sand, but its conglomeratic character would in general preclude its use for such purpose.

### QUAKERTOWN "RIDER" COAL.

The **Quakertown "Rider" Coal**, coming just below the Upper Connoquenessing Sandstone and a few feet above the Quakertown Coal, is a lenticular deposit of only scant occurrence in the county. The following opening appears to represent it:

#### Granville Schoonover Prospect—No. 86 on Map II.

On the west slöpe of Backbone Mountain at the head of a branch of Mill Run, 3.4 miles northeast of Hendricks; Quakertown "Rider" Coal; elevation, 3380′ B.

| | Ft. | In. |
|---|---|---|
| Shale, gray, sandy, with iron ore and plant fossils. | 3 | 0 |
| Coal, soft | 0 | 11 |
| Shale, pavement, and concealed, to Quakertown Coal | 16 | 0 |

A sample (No. 406R) was collected at the above prospect, the composition of which is published under **Mine No. 86** in the Table of Coal Analyses at the end of Chapter XIII. Although sampled at the outcrop the analysis reveals a coal that is low in ash and other impurities, the attempt to mine it having been unsuccessful because it was too thin.

### QUAKERTOWN BLACK SHALE.

The **Quakertown Black Shale,** coming between the Quakertown "Rider" and Quakertown Coals, is present in Tucker County in typical character. As a rule it is a black, fissile, carbonaceous deposit, varying in thickness from 2 to 10 feet and often carrying **Naiadites** fossils of fresh- or brackish-water origin. In Chapter IV its position and character are noted in the sections for Parsons, Douglas, Davis, Otter Creek, and Red Creek. At the exposure noted in the Douglas Section, it is visible in the gorge of North Fork of Blackwater

River, about one-third mile below Douglas, where the stream forms a cataract over the lower portion of the Upper Connoquenessing Sandstone, the shale being exposed beneath the falls. Here it carries **Naiadites and also numerous plant fossils**, among which some fine specimens of **Lepidodendron** occur, collections of both the fauna and flora having been made by Dr. Price and the writer. This horizon has been traced over several counties in northern West Virginia, and owing to its distinctive character has proved to be of great value in the correlation of the upper members of the Kanawha Group, its interval from the top of the Homewood Sandstone varying from 175 to 250 feet.

## QUAKERTOWN (WINIFREDE?) COAL.

The **Quakertown (Winifrede?) Coal**, coming just below the Quakertown Black Shale and from 5 to 15 feet below the Upper Connoquenessing Sandstone, is present generally at its proper position in the Pottsville sediments of the county. As a rule it is a soft, single- or double-bedded coal, varying from 0 to 2 feet in thickness. As expressed and elaborated in various other County Reports, it is the opinion of the writer that this coal is the same as the Winifrede of the Great Kanawha Valley, based largely on the fact that a fossiliferous shale or limestone occurs a few feet below it that seems to represent the Winifrede Limestone occurring at the type locality of the Winifrede Coal. In Chapter IV the coal is noted in the sections for Douglas, Davis, Otter Creek, and Red Creek. In some localities attempts have been made to mine it for local domestic fuel, but most of these openings have been abandoned. In the Backbone Mountain region it may ultimately furnish a small amount of domestic coal but it is too thin for commercial mining. The following openings and exposures were noted:

### Granville Schoonover Farm Mine—No. 87 on Map II.

On west slope of Backbone Mountain at the head of a branch of Mill Run, 3.4 miles northeast of Hendricks; **Quakertown (Winifrede?) Coal**; elevation, 3363′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Shale, dark, sandy, Quakertown | | | | |
| 2. | Coal, soft | 0′ | 8½″ | | |
| 3. | Slate, dark | 0 | 0½ | | |
| 4. | Coal, soft | 0 | 7 | 1 | 4 |
| 5. | Shale, pavement | | | | |

A sample (No. 407R) was collected from Nos. 2 and 4 of section, the analysis of which is published under Mine No. 87 in the Table of Coal Analyses at the end of Chapter XIII. The analysis reveals a high content of ash, believed to be largely due to the fact that the sample came from the outcrop where the coal was very dirty.

## West Virginia Central & Pittsburgh Railway Exposure—No. 88 on Map II.

On north side of Blackwater River just northwest of forks and 1 mile southwest of Douglas; Quakertown (Winifrede?) Coal; elevation, 2725′ B.

| | Ft. | In. |
|---|---|---|
| Concealed and dark shale, Quakertown | 4 | 6 |
| Coal | 0 | 6 |
| Fire clay shale | | |

## West Virginia Central & Pittsburgh Railway Farm Mine—No. 89 on Map II.

On the east slope of Backbone Mountain at the head of Long Run of North Fork; Quakertown (Winifrede?) Coal; elevation, 3500′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Shale, dark, Quakertown | | | .. | .. |
| 2. | Coal, bony | 0′ | 9″ | | |
| 3. | Coal, soft, columnar | 2 | 0 | 2 | 9 |
| 4. | Shale, pavement | | | | |

A sample (No. 412R) was collected from No. 3 of section, the composition of which is published under Mine No. 89 in the Table of Coal Analyses at the end of Chapter XIII. The analysis reveals a high-grade coal, very low in ash, sulphur, and phosphorus.

## Otter Creek Boom & Lumber Company Exposure—No. 90 on Map II.

On Coal Run of Otter Creek, 1.5 miles southwest of Otter; Quakertown (Winifrede?) Coal; elevation, 2984′ B.

| | | Ft. | In. |
|---|---|---|---|
| Shale, dark, sandy, Quakertown | | | |
| Coal, soft | 1′ 1″ | | |
| Shale, dark | 0 8 | | |
| Coal, bony | 0 3 | 2 | 0 |
| Fire clay shale, dark | | | |

## Robert Bridges Heirs Exposure—No. 91 on Map II.

On Red Creek, 0.4 mile below forks and 4.5 miles northeast of Laneville; Quakertown (Winifrede?) Coal; elevation, 3320′ B.

| | | Ft. | In. |
|---|---|---|---|
| Shale, black, peacock-colored, Quakertown | | .. | .. |
| Coal, good, soft | 0′ 9″ | | |
| Coal, bony | 0 5 | 1 | 2 |
| Shale, dark, sandy | | | |

### WINIFREDE LIMESTONE.

The **Winifrede Limestone,** which contains abundant marine fossils at its type locality in the Great Kanawha Valley, is believed to be represented in Tucker by a black shale which comes only a few feet below the Quakertown (Winifrede?) Coal and which contains a limited fauna of brackish-water origin. Reviewing briefly the data on this horizon, as elaborated in various reports of the Survey, it may be stated that the Winifrede Limestone in the Great Kanawha Valley occurs at an interval of 60 to 70 feet below the Winifrede Coal. From that region northeastward this interval gradually decreases in conformity with the well-known decrease in Pottsville sediments, until, in southeastern Braxton County where is has been positively identified, it lies only a few feet below the Winifrede Coal, and approximately 240 feet below the top of the Homewood Sandstone. In northern Webster it has been doubtfully identified, with a greatly curtailed fauna but with approximately the same intervals to the upper members as found in Braxton. In Upshur, Randolph, and Barbour Counties, which lie between Webster and Tucker, it has not been recognized, field work in these three counties having been completed before the determinations in Braxton and Webster became available. It is believed, however, that a search at its proper horizon in these counties would reveal it, though probably with much restricted fauna.

In Tucker County its horizon has been noted in the sections for Douglas, Otter Creek, and Red Creek, published in Chapter IV, its position being only a few feet below the Quakertown Coal, and its character being that of a dark or sandy shale, similar to its occurrence in Braxton and Webster. At the locality of the Otter Creek Section, it is well exposed on Coal Run of Otter Creek, 1.4 miles southwest of Otter Station, at an elevation of 2960′ B., coming only a few feet under the Quakertown Coal, being 20 feet thick, and containing **Lingulae** near the middle of the deposit. The fossils at this point occur 250 feet below the top of the Homewood Sandstone, corresponding closely with the interval found in Braxton and Webster. Inasmuch as the interval from the top of the Homewood to the Quakertown Coal varies only slightly in passing from Tucker County southwestward to Webster and Braxton, there is little further doubt in the mind of the writer that the Otter Creek exposure represents the Winifrede Limestone and that the Quakertown Coal of western Pennsylvania represents the Winifrede Coal of the Kanawha Valley.

Beneath the Winifrede Limestone there is an interval of 20 to 50 feet occupied mainly by dark or sandy shales, interspersed with lenticular beds of shaly sandstone, near the bottom of which a five-foot stratum of dark shale containing coal spars was noted (Davis Section, page 133) that may represent the **Williamson Coal** of the southwestern portion of the State, or possibly some member of the Chilton Coal stage, its identity depending largely on the correlation of the marine member just below it, as hereafter described.

## BLACKWATER SHALE AND LIMESTONE.

The **Blackwater Shale and Limestone**, not previously described, is a marine faunal member that was observed on the north side of Blackwater River, 2 miles southwest of Davis and one-half mile below Blackwater Falls, its nature and stratigraphic relationship being exhibited in the Davis Section, page 133. As therein described it consists of 15 feet of dark shale, below which there is 7 inches of ferruginous limestone, there being marine fossils of the familiar Kanawha types in the lower portion of the shale and in the limestone, its base being 280 feet below the top of the Homewood Sandstone and 115 feet below the Quakertown Coal horizon. It seems quite probable that this member correlates with the **Dingess Limestone** of Mingo County, which has been definitely traced as far northeastward as northern Nicholas County where it is abundantly fossiliferous. According to Dr. Price, however, few, if any, of the marine members of the Kanawha Group contain diagnostic species that would distinguish them, since the principal shells noted range through the entire group. That being the case it would seem unsafe to attempt the definite correlation of the marine member found in the Blackwater gorge and it is designated by the above local title, pending further study. In addition to the exposure at its type locality it is noted in the section for Douglas, page 127, being 30 feet thick and containing plant fossils.

## LOWER GILBERT SANDSTONE.

The **Lower Gilbert Sandstone,** which is one of the massive members of the Kanawha Group of wide persistence through many counties in the State, appears to be well represented in Tucker County by a massive, gray, medium-coarse sandstone coming a few feet below the Blackwater Shale and Limestone, from which it is separated by 10 to 20 feet of sandy shale, and having its base 350 to 375 feet below the top of the Homewood Sandstone. In Chapter IV it is noted in the sections for Hendricks, Douglas, Davis, and Otter Creek. It is quite probable that this member is the same as the Lower Connoquenessing of western Pennsylvania, as it is the first massive ledge below the Upper Connoquenessing, there being a shaly interval of 100 to 125 feet between the two in Tucker County. It is herein correlated as the Lower Gilbert because of its relationship to the Gilbert Coal, which seems to persist across the State, and because of its position with reference to the Nuttall Sandstone, the identity of which in Tucker County seems fairly certain. The sandstone correlated as the Lower Gilbert in this Report appears to be the same as that which was described as the Upper Gilbert in the County Report on Barbour, Upshur, and the Western Portion of Randolph, coming a few feet above the Gilbert Coal, the field work which has been done subsequent to the publication of that Report indicating quite clearly that the Lower Gilbert is much the more massive and persistent of the two.

Anticipating inquiry as to what may have become of the several hundred feet of strata lying between the Dingess (Blackwater?) Limestone and the Lower Gilbert Sandstone, including the Cedar Grove, Alma, Campbell Creek (No. 2 Gas), and Eagle Coals, with their attendant sandstones and occasional marine shales, which occur in the Great Kanawha Valley and elsewhere in the southwestern portion of the State, it may be said that in passing from Fayette and Nicholas Counties northeastward through Webster, Upshur, Randolph, and Barbour Counties, the sandstones in this interval gradually become lenticular, thin or shaly, the coals gradually thin out and the marine members appear to lose most of their fossils. The Cedar Grove Coal appears to be of no value or consequence northeast of Webster County. The Alma is not of much value northeast of Fayette. The Campbell Creek and Eagle are persistent as far northeast as the western portion of Randolph but appear to thin away almost completely in southern Barbour. The Eagle Limestone, which is a widely persistent marine member in the southwestern portion of the State has not been identified with certainty northeast of Nicholas County, beyond which its fossils seem to disappear, although they have been doubtfully noted in northern Webster. It should be explained, however, that only part of the above generalizations apply to that portion of the upper valley of Shavers Fork of Cheat River in Randolph and Pocahontas Counties above Bemis, where unpublished data indicate the presence of certain of these coals.

If the above statement, epitomizing the result of many years of investigation, be accepted, it is apparent that the principal northeastward thinning of the Kanawha Group has occurred between the Quakertown (Winifrede?) Coal and the

Gilbert stage, the Douglas stage of coals and sandstones lying below the Gilbert having also disappeared. As stated in former Reports the Upper Connoquenessing Sandstone loses its identity as a massive, conglomeratic unit in southern Upshur, beyond which, toward the southwest, it breaks up into two or three smooth-grained ledges separated by coals and shales.

### GILBERT SHALE.

The **Gilbert Shale,** occurring between the Lower Gilbert Sandstone and the Gilbert Coal, appears to be represented in Tucker at certain localities, being dark, or sandy and laminated, with a thickness of 0 to 20 feet. In the section for Douglas, page 127, it is noted as 35 feet thick. In portions of the great Kanawha Valley this shale carries a limited marine fauna but no fossils were observed at its horizon in Tucker.

### GILBERT COAL.

The **Gilbert Coal,** belonging just below the Gilbert Shale and often directly beneath the Lower Gilbert Sandstone when the shale is absent, appears to be represented in Tucker by occasional exposures, being from 0′ 6″ to 2′ 0″ in thickness, and worthless from a commercial standpoint. In Chapter IV it is noted in the sections for Hendricks, Backbone Mountain, and Otter Creek. The following exposures were observed:

#### Coal Blossom—No. 92 on Map II.

On north side of Blackwater River, 2.1 miles northeast of Hendricks; **Gilbert Coal**; elevation, 3210′ B.
**Coal blossom,** thickness unknown.

#### Coal Exposure—No. 93 on Map II.

On south side of Blackwater River, 3.7 miles northeastward from Hendricks; **Gilbert Coal;** elevation, 2765′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, massive, cliff, **Lower Gilbert** | 50 | 0 |
| Concealed | 15 | 0 |
| Shale, dark, **Gilbert** | 15 | 0 |
| **Coal** | 0 | 6 |
| Fire clay shale, visible | 2 | 0 |

### Coal Prospect—No. 94 on Map II.

In the forks between Blackwater and Dry Fork Rivers, 1.5 miles east of Hendricks; **Gilbert Coal**; elevation, 2910′ B.
Fallen shut, thickness unknown.

### Otter Creek Boom & Lumber Company Exposure—No. 95 on Map II.

On Coal Run of Otter Creek, 1.3 miles southeast of Otter; **Gilbert Coal**; elevation, 2890′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, massive, cliff, **Lower Gilbert** | 60 | 0 |
| **Coal**, medium-soft | 1 | 9 |
| Fire clay shale | | |

### Coal Blossom—No. 96 on Map II.

On Gandy Creek, 1.6 miles northward from Laneville; **Gilbert Coal**; elevation, 3790′ B.

| | Ft. | In. |
|---|---|---|
| **Coal blossom** | 0 | 6 |

## GENERAL DESCRIPTION, NEW RIVER GROUP OF POTTSVILLE.

The New River Group of the Pottsville Series is characterized in Tucker County by a heavy sandstone at the top, followed by a stage of dark or sandy shales in which there are thin and lenticular coals, succeeded in turn by a heavy sandstone ledge near the middle of the group, below which coals, dark or sandy shales, and massive sandstones make up the remainder. Limestone is almost totally absent. One of the shale members carries a restricted fauna that is of fresh- or brackish-water origin, typical marine fossils (**Lingula** excepted) being absent. In the lower portion of the group there is one coal of commercial rank that is widely persistent. The total thickness of the group, as shown by the general section of the Pottsville on a previous page, is approximately 275 feet.

## DESCRIPTION OF MEMBERS, NEW RIVER GROUP OF POTTSVILLE.

### UPPER AND LOWER NUTTALL SANDSTONES.

The **Upper and Lower Nuttall Sandstones,** consisting, in the region of maximum New River sediments in the southwestern portion of the State, of two massive ledges each of which is often 100 feet in thickness, and being separated by a slight break of shale in which a thin coal is occasionally found, appear to be represented in Tucker by one ledge, usually 50 to 75 feet, but in some cases 100 feet thick. Speculation as to whether this stratum represents either the Upper or Lower Nuttall or a combination of the two would be idle conjecture. This member is massive, gray, coarse-grained and sometimes conglomeratic, and is persistent throughout the region of New River outcrops. In Chapter IV it is noted in the sections for Parsons, Hendricks, Backbone Mountain, Douglas, Otter Creek, Buena, Laneville, Little Stonecoal Run, Stonecoal Run, and Red Creek. Its interval above the Sewell (Sharon?) Coal varies from 40 to 80 feet, and being usually the second ledge above that member its position in any region of the county where it outcrops may readily be noted from the varions exposures of this Coal. One of its most prominent and easily accessible outcrops is along the Western Maryland Railway grade, just west of the mouth of North Fork of Blackwater River where it makes a massive ledge, its position being 40 feet above the Sewell (Sharon?) Coal which outcrops at grade (see Coal Exposure No. 111 on Map II), and its thickness being 80 feet. So far as known it has not been quarried in the county but its durable character and usually smooth texture should make it of value for heavy masonry construction.

### UPPER IAEGER SHALE.

The **Upper Iaeger Shale,** coming between the Nuttall Sandstones and the Hughes Ferry Coal, in represented in Tucker by a dark, sandy shale, usually 5 to 15 feet thick, but sometimes entirely missing. So far as known it contains no fauna and is of little scientific or economic importance. Various exposures of this shale are noted under the description of the Hughes Ferry Coal on subsequent pages.

## HUGHES FERRY COAL.

The **Hughes Ferry Coal** of Nicholas County, coming just under the Upper Iaeger Shale and a few feet beneath the Lower Nuttall Sandstone, is represented at its proper horizon in Tucker by a lenticular bed, 0′ 6″ to 2′ 0″ in thickness. As a rule it is a soft, columnar coal of typical New River character and good quality. From an economic standpoint it appears to be too thin for mining in the county, except possibly along Otter Creek near the Randolph County Line where it begins to thicken southward and might furnish a small amount of local fuel. The following openings and exposures were noted:

### Otter Creek Boom & Lumber Company Exposure—No. 97 on on Map II.

On west side of Dry Fork, 1 mile northwest of Otter; **Hughes Ferry Coal**; elevation, 2845′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, cliff, **Nuttall** | 20 | 0 |
| Shale, sandy, dark, with fire clay, **Upper Iaeger** | 15 | 0 |
| **Coal** | 0 | 6 |
| Shale, pavement | | |

### Otter Creek Boom & Lumber Company Exposure—No. 98 on Map II.

On Coal Run of Otter Creek, 1.2 miles southwest of Otter; **Hughes Ferry Coal**; elevation, 2775′ B.

| | Ft. | In. |
|---|---|---|
| Shale, dark, sandy, **Upper Iaeger** | 24 | 0 |
| **Coal**, soft | 0 | 11 |
| Fire clay shale | | |

### Otter Creek Boom & Lumber Company Prospect—No. 99 on Map II.

On Possession Camp Run of Otter Creek, about one-half mile south of Tucker-Randolph County Line; **Hughes Ferry Coal**; elevation 2780′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. | Shale, dark, sandy, with numerous plant fossils, **Upper Iaeger** | | 5 | 0 |
| 2. | **Coal**, medium-hard | 0′ 6″ | | |
| 3. | **Coal**, soft | 1 1 | 1 | 7 |
| 4. | Fire clay shale, ferruginous, to creek | | 5 | 0 |

A sample (No. 428R) was collected from Nos. 2 and 3 of section, the composition of which is published under **Mine No. 99** in the Table of Coal Analyses at the end of Chapter XIII. The analysis reveals a very pure coal, exceptionally low in ash, sulphur, and phosphorus.

### Otter Creek Boom & Lumber Company Mine—No. 100 on Map II.

On west side of Otter Creek, approximately 1.5 miles above Tucker-Randolph County Line; **Hughes Ferry Coal**; elevation, 3000′ B.

| | Ft. | In. |
|---|---|---|
| Fallen shut, reported 2′ 6″ to | 3 | 2 |

At the above opening the coal was once mined for railroad fuel by the Otter Creek Boom and Lumber Company but the operation was abandoned when timber hauling ceased along the creek. The old opening has entirely fallen shut, its thickness being reported by Adam Phillips, guide. A sample (No. 426R) was collected from an old stock pile at the base of the incline, the composition of which is published under **Mine No. 100** in the Table of Coal Analyses at the end of Chapter XIII. The analysis shows 27.49 per cent. of ash, indicating the rapid deterioration of the coal when exposed to the air, this figure being nearly 10 times as high as the sample at Mine No. 99 in the same valley. A comparison of the two analyses reveals the fact that the only essential difference is in fixed carbon, indicating the oxidation of that constituent.

### Otter Creek Boom & Lumber Company Mine—No. 101 on Map II.

On east side of Otter Creek, approximately 2.5 miles above Tucker-Randolph County Line, and one-half mile below Yellow Creek; **Hughes Ferry Coal**; elevation, 3040′ B.

PLATE IX.—Looking southeast from road on Canaan Mountain across anticlinal Canaan Valley. Flat land is mainly Greenbrier with low ridge of Pocono along left middle. Cabin Mountain in background capped by Pottsville.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, dark, sandy, Upper Iaeger | | | 3 | 0 |
| Coal | 1' | 2" | | |
| Concealed by water (coal?) | 1 | 2 | 2 | 4 |

A small operation once existed at the above locality but it has been abandoned for several years.

### Robert Bridges Heirs Exposure—No. 102 on Map II.

On Red Creek, 0.8 mile below forks and 4.2 miles northeast of Laneville; Hughes Ferry Coal; elevation, 3240' B.

| | Ft. | In. |
|---|---|---|
| Shale, sandy, Upper Iaeger | 9 | 6 |
| Coal | 0 | 6 |
| Shale, dark, sandy, with Sigillariae and iron ore, Lower Iaeger | 35 | 0 |

## LOWER IAEGER AND SANDY HUFF SHALES.

The **Lower Iaeger and Sandy Huff Shales**, separated from each other in the expanded section of the New River Group in the southwestern part of the State by various sandstones and thin coals, appear to be the only remnants of this stage between the Hughes Ferry and Castle Coals in Tucker County. As observed therein they usually comprise from 10 to 30 feet of uniformily dark, argillaceous or sandy material, frequently ferruginous in the lower portion. So far as known they are free from faunal remains, but often contain plant fossils. Speculation as to whether this bed of shale represents either the Lower Iaeger or the Sandy Huff, or a combination of the two, would be futile without extensive paleobotanic investigation. In Chapter IV they are noted in the sections for Otter Creek and Red Creek. Its exposure is also recorded under the description of the Castle Coal on a subsequent page.

## CASTLE COAL.

The **Castle Coal**, belonging just below the Sandy Huff Shale in the expanded section of southwestern West Virginia, appears to be represented in Tucker by a lenticular bed varying in thickness from 0 to 1 foot, and being entirely worthless from an economic standpoint. The following exposure is the only occurrence of this coal noted in the county:

### Otter Creek Boom & Lumber Company Exposure—No. 103 on Map II.

On Coal Run of Otter Creek, 1.2 miles southwest of Otter; **Castle Coal**; elevation, 2750' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Fire clay shale, and dark shale, **Sandy Huff** | | | 24 | 0 |
| **Coal** | 0' | 7" | | |
| Slate, black | 0 | 3 | | |
| **Coal** | 0 | 4 | 1 | 2 |
| Fire clay shale | | | | |

#### GUYANDOT AND LOWER GUYANDOT SANDSTONES.

The **Guyandot and Lower Guyandot Sandstones,** separated into two distinct ledges in the southwestern part of the State by a slight shale interval that often contains the Sewell "B" Coal, appear to be mainly represented in Tucker by a single ledge, the break between the two having been noted at a few localities, at one of which the coal is present, as will be later detailed. As observed at most points in the county, this horizon is a hard, gray, massive ledge, varying from 25 to 50 feet in thickness, and frequently forming cliffs of considerable extent. In Chapter IV it is noted in the sections for Limestone Mountain, Hendricks, Laurel Run of Dry Fork, Douglas, Otter Creek, Buena, Little Stonecoal Run, Stonecoal Run, and Red Creek, the division between the two ledges being in some instances indicated. Owing to the presence of the Sewell (Sharon?) Coal only a few feet below this sandstone stage, its distinction from other arenaceous strata of the New River Group is easily made.

#### SKELT SHALE.

The **Skelt Shale,** coming between the Guyandot Sandstone and Sewell "B" Coal at its type locality in Webster County where it is distinguished by the presence of a well-defined specimen of **Orbiculoidea capuliformis,** as well as **Naiadites elongata** and other brackish-water species, and being, so far as known, the only horizon of the New River Group that contains marine fauna other than the common **Lingula**, appears to be almost entirely absent in Tucker. It was noted, however, at the locality of **Coal Exposure No. 104**, as detailed below under the description of the Sewell "B" Coal, being 28 feet thick, and sandy, no fossils having been observed. It is doubtless present at a few other localities where the Guyandot and Lower Guyandot Sandstones are separated by shale.

### SEWELL "B" COAL.

The **Sewell "B" Coal**, coming in the interval between the Guyandot and Lower Guyandot Sandstones and just under the Skelt Shale, is seldom present in Tucker, and is entirely worthless from an economic standpoint, the following being the only exposure noted in the county:

#### Dobbin Manor Exposure—No. 104 on Map II.

On east side of Dry Fork, 1.2 miles northeast of Otter; **Sewell "B" Coal**; elevation, 2795′ B.

| | | Ft. | In. |
|---|---|---|---|
| Shale, sandy, **Skelt** | | 28 | 0 |
| **Coal** | 0′ 2″ | | |
| Shale, gray | 1 0 | | |
| **Coal** | 0 5 | 1 | 7 |
| Shale | | | |

### HARTRIDGE BLACK SHALE.

The **Hartridge Black Shale**, coming between the Lower Guyandot Sandstone and the Sewell (Sharon?) Coal, is well represented in Tucker, being usually dark, laminated, and sandy, with occasional concretions of iron, and varying in thickness from 5 to 20 feet. At its type locality in Randolph County, as well as at numerous localities in other counties, this shale carries a profusion of **Naiadites elongata**. In Tucker County these fossils were found at a few localities in the valley of Red Creek near Laneville, as will be detailed in Chapter XIII under the description of the Sewell (Sharon?) Coal. In Chapter IV the shale is noted in the sections for Hendricks, Laurel Run of Dry Fork, Douglas, Otter Creek, Little Stonecoal Run, Stonecoal Run, and Red Creek.

### SEWELL (SHARON?) COAL.

The **Sewell Coal,** of Fayette County, West Virginia, belonging a few feet below the Lower Guyandot Sandstone and just beneath the Hartridge Black Shale, is well represented in Tucker. As a rule it is soft and columnar in the upper portion, the basal bench of one foot or more being laminated to such an extent with fine slate partings that it must be discarded in mining. The total thickness of the seam varies from 1 to 5 feet. In the region of its outcrop, it is generally present, but in those portions of the North Potomac and Stony River Synclines where it is deeply buried under drainage, nothing is known as to its character and thickness, as no borings have pierced its horizon.

Regarding the proper place of the Sewell Coal in the Pottsville Series of western Pennsylvania, it may be stated that it has now been traced from its type locality northeastward along its outcrop through Fayette, Nicholas, Webster, Randolph, Tucker, Barbour, and Preston to the Pennsylvania State Line, and as elaborated in several previous Reports it apparently correlates with the **Sharon Coal** of Pennsylvania, the evidence being seemingly complete and conclusive, the associated lithologic and stratigraphic data bearing out and confirming the original conclusion reached many years ago by Dr. David White, on the basis of fossil plants.

The outcrop of the Sewell (Sharon?) Coal is delineated on Map II and in Chapter XIII will be found a further discussion of its thickness, distribution, and chemical character, together with many detailed bed sections, and an estimate of its tonnage.

### WELCH SANDSTONE.

The **Welch Sandstone,** coming a few feet under the Sewell Coal, appears to be represented in the Stony River Basin in the vicinity of Laneville, but in the North Potomac Basin has almost entirely thinned away, except for occasional shaly lentils. In the Laneville region it is 25 to 35 feet in thickness, gray and massive, its presence being noted in the sections for Stonecoal Run and Red Creek, as published in Chapter IV.

## WELCH COAL.

The **Welch Coal,** coming just below the Welch Sandstone, is represented in Tucker mainly by a bed of bituminous shale, coming 20 to 30 feet below the Sewell Coal, its presence being noted in Chapter IV in the sections for Douglas and Stonecoal Run. The following exposure of the coal was observed:

### Robert Bridges Heirs Exposure—No. 129 on Map II.

On Red Creek, 4 miles northeast of Laneville; Welch Coal; elevation, 3125′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, massive, Welch | 35 | 0 |
| Shale, dark | 1 | 0 |
| Coal, slaty | 1 | 0 |
| Shale, dark | | |

## UPPER RALEIGH (SHARON?) SANDSTONE.

The **Upper Raleigh Sandstone,** coming a few feet under the Welch Coal in the region of maximum New River sediments, is well represented in Tucker, being gray, massive, sometimes pebbly, and varying from 25 to 70 feet in thickness, its position being 20 to 40 feet below the Sewell Coal. In Chapter IV it is noted in the sections for Backbone Mountain, Douglas Otter Creek, Little Stonecoal Run, Stonecoal Run, and Red Creek. This sandstone has been traced continuously from its type locality in Raleigh County, northeastward through Fayette, Nicholas, Webster, Randolph, Tucker, and other associated counties to the Pennsylvania State Line, and apparently correlates with the **Sharon Conglomerate** of the Pottsville section of western Pennsylvania, as stated in several previous Reports.

## FIRE CREEK COAL.

The **Fire Creek Coal,** of Fayette County, West Virginia, is represented in Tucker by a lenticular bed coming just below the Upper Raleigh (Sharon?) Sandstone, the intervening sandstones, shales, and coals which separate the two members in the region of maximum New River sediments having apparently thinned away completely. As observed in Tucker County its position is 50 to 100 feet below the Seweli (Sharon?) Coal, and when present in any quantity it is double-bedded, containing a large parting of slate or bony coal near the middle. Owing to this impurity it is not believed that it will furnish commercial fuel at any point in the county but in the Stony River Basin may provide a small amount of low-grade domestic coal. When present in the North Potomac Basin it is usually just above the red Mauch Chunk Shales but in the Stony River Basin near Laneville it is sometimes separated from them by the lenticular Pineville Sandstone. In Chapter IV it is noted in the sections for Douglas and Stonecoal Run. The following openings and exposures were noted:

### Coal Prospect—No. 130 on Map II.

On west side of Dry Fork, 1 mile northwest of Otter; **Fire Creek Coal**; elevation, 2700′ B.

Fallen shut; not much found; comes at top of red shale.

### West Virginia Central & Pittsburgh Railway Exposure—No. 131 on Map II.

On North Fork of Blackwater River, just above mouth and 0.9 mile south of Douglas; **Fire Creek Coal**; elevation, 2425′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, massive, with Calamites, etc., in base, **Upper Raleigh (Sharon?)** | 40 | 0 |
| Slate, black, with streaks of **coal** | 1 | 0 |
| Sandstone, massive, with nodules of iron pyrites (crystalline structure) in top, **Pineville** | | |

At the above locality, a sample (No. 411R) was collected from the pyrite nodules coming in the shaly top of the sandstone just below the coal, the composition of which is reported as follows by Hite and Krak:

| | Per cent. |
|---|---|
| Insoluble Matter | 12.41 |
| Metallic Iron | 40.62 |
| Sulphur | 32.24 |

It is not at all clear that the above deposit of sulphur is primarily derived from that which the Fire Creek Coal horizon may have contained, as it may have been deposited largely from the sulphurous waters of the extensive coal field of North Fork leaching out during the period when orogenic disturbances reached their maximum.

### Otter Creek Boom & Lumber Company Prospect—No. 132 on Map II.

On west side of Dry Fork, 0.8 mile west of Moore Siding; Fire Creek Coal; elevation, 2830′ B.

| | Ft. | In. |
|---|---|---|
| Fallen shut; reported | 1 | 8 |

### Babcock Lumber & Boom Company Exposure—No. 133 on Map II.

On Red Run, 3 miles northeastward from Elk; Fire Creek Coal; elevation, 3165′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone, massive, Upper Raleigh (Sharon?) | 15 | 0 |
| Coal | 1 | 0 |
| Shale, black | 30 | 0 |
| Sandstone, massive, to creek | 5 | 0 |

### Babcock Lumber & Boom Company Exposure—No. 134 on Map II.

On Red Run, 2.8 miles northeast of Elk; Fire Creek Coal; elevation, 3215′ B.

| | Ft. | In. |
|---|---|---|
| Sandstone. massive, makes falls, Upper Raleigh (Sharon?) | 10 | 0 |
| Shale, sandy, partly concealed | 15 | 0 |
| Coal, bony | 1 | 0 |
| Shale, black, sandy | 2 | 0 |
| Sandstone, massive, Pineville | 8 | 0 |
| Shale, red, to forks of Red Run | 10 | 0 |

### Robert Bridges Heirs Prospect—No. 135 on Map II.

On Stonecoal Run of Red Creek; Fire Creek Coal; elevation, 3115′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive, **Upper Raleigh** (Sharon?).. | | | 40 | 0 |
| 2. | **Coal**, good........................ | 0′ | 4″ | | |
| 3. | Slate, bony........................ | 0 | 5 | | |
| 4. | **Coal**, bony........................ | 2 | 6 | | |
| 5. | Slate, bony........................ | 0 | 4 | | |
| 6. | **Coal**, bony........................ | 1 | 3 ....... | 4 | 10 |
| 7. | Shale, pavement................................. | | | | |

A sample (No. 453R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 135** in the Table of Coal Analyses at the end of Chapter XIII. As might be expected from the description, the ash content is extremely high (41.05 per cent.).

### Coal Blossom—No. 136 on Map II.

On a southern branch of Red Creek, 3.2 miles southeast of Laneville; **Fire Creek Coal**; elevation, 3430′ B.
**Coal** blossom, thickness unknown.

## PINEVILLE SANDSTONE.

The **Pineville Sandstone**, belonging a few feet under the Fire Creek Coal, is represented in certain localities of Tucker County, but is usually absent. When present in the section it varies from 5 to 20 feet in thickness, coming between the Fire Creek Coal and the red Mauch Chunk Shales, being the basal member of the Pottsville in the county. In Chapter IV it is noted in the sections for Douglas and Red Creek.

# CHAPTER VIII.

## STRATIGRAPHY--MAUCH CHUNK SERIES.

### GENERAL ACCOUNT AND SECTION, MAUCH CHUNK SERIES.

The Mauch Chunk Series of the Mississippian Period, coming immediately below the Pottsville Series of the Pennsylvanian, which rests upon it unconformably, comprises a large body of the outcropping sediments of Tucker County. The series consists primarily of red, or sometimes greenish shales, ordinarily laminated but often slickensided, together with occasional beds of fine-grained, micaceous, flaggy sandstones which are lenticular in their occurrence. Toward the southern end of the county a massive conglomerate appears in the upper portion and another massive ledge occurs at the base of the series. Limestone is almost totally absent, there being a few exposures of a thin calcareous and fossiliferous stratum in the lower portion along the waters of Dry Fork of Cheat River and in the Canaan Valley. Coal appears to be entirely absent, certain lenticular deposits which occur in counties farther southwest having thinned out completely.

Being largely of a continental nature the sediments of the Mauch Chunk Series differ materially from those of the Pottsville above it. In contrast to the abundant plant life of the upper coal measures, fossil vegetation is scanty and but poorly preserved, and fossil fauna, with the exception noted above, appears to be entirely lacking. From an economic standpoint the series is largely barren of valuable deposits, its principal function being that of a soil maker. Coals are absent and the sandstones, in the main, are too shaly for use as building material. The beds of red shale, however, could be utilized for common building brick, and building or sewer tile, being available in large quantity at many points where the cost of quarrying could be reduced to a minimum. Owing to the presence of iron most of them would burn to a rich red color. As a source of iron manufacture, the same shales have no possibilities under present metallurgical practice. As a rule they carry eight to ten per cent. of ferric iron ($Fe_2O_3$), yielding roughly 5½ to 7 per cent. of metalic iron.

The two following analyses illustrate the chemical character of the red shales, sample No. 452R having been collected from a 30-foot bed of shale from the Robert Bridges Heirs property 0.8 mile east of Laneville and just northwest of the forks of Red Creek, the base of the bed being 10 feet above drainage and having an elevation of 2610′ B., its position in the series being estimated as about 200 feet above the top of the Greenbrier Limestone. Sample No. 403R was collected in the Canaan Valley public road, 0.2 mile northwest of Maple Grove School and 1.1 miles northward from Cortland, from a 30-foot bed of shale coming just above the Hinton Limestone, at an elevation of 3230′ B. These two samples, as reported by Hite and Krak, are as follows:

| | Sample No. 452R. Per cent. | Sample No. 403R. Per cent. |
|---|---|---|
| Silica ($SiO_2$) | 55.50 | 54.80 |
| Ferric Iron ($Fe_2O_3$) | 9.24 | 7.99 |
| Alumina ($Al_2O_3$) | 19 20 | 21.86 |
| Lime (CaO) | 1.97 | 0.90 |
| Magnesia (MgO) | 2.33 | 2.40 |
| Potassium Oxide ($K_2O$) | 3.58 | 3.08 |
| Sodium Oxide ($Na_2O$) | 1.20 | 1.10 |
| Titanium Oxide ($TiO_2$) | 0.46 | 0.38 |
| Phosphoric Acid ($P_2O_5$) | 0.24 | 0.07 |
| Moisture | 1.32 | 3.40 |
| Loss on Ignition | 5.66 | 3.97 |
| Totals | 100.70 | 99.95 |

The series outcrops along the entire eastern slope of Laurel Ridge; on either side of Limestone Mountain; on the entire western slope of Backbone Mountain; on both sides of

McGowan, Green, Mozark, and Canaan Mountains; and in the valley of Blackwater River between the mouth of North Fork and Hendricks. Farther up Blackwater River it rises above drainage again approximately three miles above Davis and comprises a large portion of the outcropping sediments in the Canaan Valley, where the iron content of the drainage appears to combine with tannic acid from the vegetation of the valley, forming tannate of iron, or ink, and imparting to the water the deep, black color from which the river derives its name. On the headwaters of Beaver Creek there is a limited outcrop along the Blackwater Anticline, and in the valley of Red Creek, farther south, there is another abundant outcrop, the creek deriving its name from the prevailing red sediments.

In thickness the series increases progressively from northwest to southeast, being only 305 feet in Limestone Mountain, as contrasted with 985 feet at Flanagan Hill and 835 feet at Laneville. The following general section, compiled from the measured sections of Chapter IV, as well as from other detailed exposures, illustrates the nature of its sediments and principal lithologic members, the intervals being mainly those of the region of its maximum thickness in the county:

### General Section of the Mauch Chunk Series for Tucker County.

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Shale, red or green, with lenticular, green and flaggy sandstone | 20 to 175 | 175 |
| Sandstone, **Princeton Conglomerate**, massive, with large angular quartz pebbles, prominent in valley of Red Creek, near Laneville | 0 to 100 | 275 |
| Shale, red and green, with numerous lenticular, green, flaggy sandstones, horizons of **Pluto Shale, Pluto Coal,** and **Terry Limestone** (not observed in Tucker County) belonging just under the sandstone | 300 to 600 | 875 |
| Limestone, **Hinton**, with marine fossils, (possibly "Little Lime" of oil and gas well drillers) | 0 to 25 | 900 |
| Sandstone, **Webster Springs**, greenish-gray, massive or flaggy, medium-coarse | 0 to 75 | 975 |
| **Greenbrier Limestone** | | |

## DESCRIPTION OF MEMBERS, MAUCH CHUNK SERIES.

### PRINCETON CONGLOMERATE.

The **Princeton Conglomerate,** of Mercer County, West Virginia, which from its nature and distribution is evidently a littoral deposit extending from its type locality northeastward through a comparatively narrow belt across the State, is mainly represented in Tucker by exposures on the tributaries of Red Creek near Laneville. In this region it is a massive conglomerate, with angular (?) quartz pebbles many of which reach 1″ or 1½″ in diameter, and much resembles the sandstones of the Pottsville above it, except that it much more nearly approaches the nature of a quartzite and plant fossils are less abundant. It is clearly distinguished from the Pottsville, however, by the presence of a bed of red or green shale above it, varying in thickness from 20 to 175 feet. On Stonecoal Run, **Cordaites** were observed in its upper portion, indicating that some of the typical plant life of the Pottsville had begun. In this locality its thickness varies from 50 to 100 feet, its presence being noted in Chapter IV in the sections for Little Stonecoal Run, Stonecoal Run, and Red Creek. North and northwest of Red Creek it apparently disappears or its nature changes to the typical green, flaggy stone of the series.

The **Pluto Shale,** a carbonaceous deposit, carrying marine fossils in Webster County, the **Pluto Coal,** a lenticular bed occurring in various central and southwestern counties, and the **Terry Limestone,** occurring just under the coal and carrying a profusion of marine fossils in various counties from Randolph southwestward, were not observed in Tucker, their horizons being imperfectly exposed owing to the great amount of talus from the Princeton ledge just above where they belong.

The **Big Spruce Knob Sandstone, Big Spruce Knob Shale,** and **Big Spruce Knob Coal,** occurring within the shale interval between the Terry and Hinton Limestones, (see Webster County Report, pages 214 and 221-225), were not observed in Tucker, having evidently thinned away northeast of their type locality in Pocahontas County.

## HINTON LIMESTONE.

The **Hinton Limestone,** of Summers County, coming well down in the lower portion of the series, is apparently represented in Tucker at a few localities in Dry Fork District. On Red Run of Dry Fork River it was noted 1.7 miles above its mouth, being 4 feet thick and shaly, and carrying numerous marine fossils, among which **Producti** were much in evidence, its elevation being 2205′ B., and its locality well marked by a cataract and overhanging cliff made by the Webster Springs Sandstone about one-third mile below its outcrop. In the section for Flanagan Hill, page 138, it is noted again, being 25 feet thick and coming a short distance above the Webster Springs Sandstone.

At this locality a sample (No. 440R) was collected on the land of Charles Wolford, the composition of which is reported as follows by Hite and Krak:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 6.56 |
| Ferric Iron ($Fe_2O_3$) | 1.09 |
| Alumina ($Al_2O_3$) | 1.09 |
| Calcium Carbonate ($CaCO_3$) | 88.50 |
| Magnesium Carbonate ($MgCO_3$) | 1.71 |
| Phosphoric Acid ($P_2O_5$) | 0.07 |
| Loss on Ignition | 0.35 |
| Total | 9937 |

In the Canaan Valley it is visible in the public road near Maple Grove School, about one mile northward from Cortland, its elevation being 3220′ B., and its outcrop, which is separated from the top of the Greenbrier Limestone by a belt of red shale, being characterized by **Crinoids** and other marine forms.

On the eastern side of the same valley it is also exposed in a ravine at the foot of Cabin Mountain, 0.3 mile northeast of the residence of Joseph E. Graham, and 1.6 miles northeast of Buena, having an elevation of 3450′ B., and being 3 feet thick and fossiliferous, there being a short trestle on the Babcock Lumber & Boom Company Railroad across the ravine a few rods below the outcrop.

## WEBSTER SPRINGS SANDSTONE.

The **Webster Springs Sandstone**, coming at the base of the series and only a few feet below the Hinton Limestone, appears to be well developed in Dry Fork District, being massive, greenish-gray, and 40 to 50 feet in thickness. On Red Run of Dry Fork River it makes a prominent overhanging cliff 1.4 miles above the mouth of the stream, being 40 feet thick, and its base, which rests on the Greenbrier Limestone, having an elevation of 2135′ B. It is recorded in the section for Flanagan Hill, page 138, coming a few feet above the top of the Greenbrier Limestone, and below the Hinton Limestone, its full thickness being partly concealed.

# CHAPTER IX.

## STRATIGRAPHY--GREENBRIER SERIES.

### GENERAL ACCOUNT, GREENBRIER SERIES.

The Greenbrier Series of the Mississippian Period, belonging just under the Mauch Chunk Red Shales and just above the Pocono Sandstones, comprises an important portion of the outcropping rocks of Tucker County, both from the standpoint of scientific interest and economic utility. Its linear extent is large but on account of its unstable nature under the action of erosive agents its width of outcrop is always narrow, usually varying from one-fourth to one-half mile, except in the Canaan Valley where the peculiar physiography has temporarily preserved some more extensive areas. It is composed of several beds of marine limestone, separated by thin strata of red and ferruginous or gray and limy shales, the beds of limestone being usually thin and siliceous toward the top of the series and more massive and more nearly pure toward its base. The more shaly portions usually contain an abundance of marine fauna, among which **Crinoids** and **Brachiopods** are prominent. Its thickness increases steadily from northwest to southeast, being only 165 feet in Limestone Mountain, near the Preston County Line, and 430 feet at Laneville, near the southeastern corner of the county. Compared to other portions of the State, its development in the county represents an intermediate phase, the usual thickness in the northern panhandle near Wheeling being only about 50 feet, while in Greenbrier, Monroe, and other southern counties near the Virginia border it attains a maximum of about 1500 feet.

In chemical character the thick beds of the basal portion have the following average composition, as determined from 14 samples:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 7.70 |
| Ferric Iron ($Fe_2O_3$) | 0.98 |
| Alumina ($Al_2O_3$) | 1.16 |
| Calcium Carbonate ($CaCO_3$) | 87.14 |
| Magnesium Carbonate ($MgCO_3$) | 2.11 |
| Potassium Oxide ($K_2O$) | 0.37 |
| Sodium Oxide ($Na_2O$) | 0.48 |
| Phosphoric Acid ($P_2O_5$) | 0.07 |
| Loss on Ignition | 0.91 |
| Total | 100.92 |

In the 14 samples from which the above average is compiled, Silica ranges from 2.39 to 15.50 per cent., Ferric Iron from 0.73 to 1.24, Alumina from 0.07 to 2.62, Calcium Carbonate from 76.60 to 96.01, and Magnesium Carbonate from 0.76 to 5.33 per cent. From the above range, as well as from the average, it is apparent that the Greenbrier of Tucker County is a limestone of intermediate rank, as compared to others of the State, having less inert matter than the average thin-bedded deposits of the Pennsylvanian, and having more of these impurities than several of the Silurian, Ordovician, and Cambrian beds which outcrop in the eastern panhandle, and having little tendency toward dolomite. As an economic deposit its impurities are too high for glass manufacture, as well as for the many other minor purposes where extremely pure lime is demanded. Some of the purer layers could be used as a flux for iron ores. As a building stone it would hardly be successful, owing to its compact structure and conchoidal fracture. It is well suited, however, for the manufacture of Portland cement, for road surfacing, and for agricultural lime.

In distribution the series outcrops in the western end of the county along the eastern slope of the Laurel Ridge from the Preston County Line southward to Randolph County, and completely encircles Limestone Mountain. In the central portion it extends from the Preston Line southward along the western slope of Backbone Mountain to Hambleton and Hendricks, going under drainage on Blackwater River three miles east of the latter town. Southwest of Hendricks it is found along the entire northern and western slopes of McGowan

PLATE X.—Ledge of Greenbrier Limestone outcrop along Dry Fork of Cheat River three-fourths mile north of Otter Creek. Pottsville boulders visible in midstream. Green Mountain in right background capped by Allegheny and Pottsville with Mauch Chunk on lower slope.

Mountain, and on Dry Fork above the same town it outcrops on either side, gradually descending southward until it is only partly above drainage at the mouth of Otter Creek where the North Potomac Syncline crosses the river, but extending four miles up Otter Creek before going under drainage. On Dry Fork south of Otter it rises gradually until it is several hundred feet above drainage at the Randolph County Line and occurs on high benches along the mountains on either side of the river. Going up Red Creek from its mouth the limestone belt gradually descends toward the Stony River Syncline until it goes under drainage just below Laneville. In the eastern portion of the county it entirely encircles the Canaan Valley, being at the foot of the mountains on either side of Blackwater and Little Blackwater Rivers. At the southern end of the valley it is connected through two low mountain gaps with the outcrops already described along Dry Fork and Red Creek. On Map II its areal extent and position are indicated in detail.

As a soil-maker the Greenbrier Series has played an important part in the economic history of the county, since its weathered surface is highly fertile. Almost its entire outcrop has been cleared, the land being devoted to agriculture and grazing, while numerous small quarries have been opened, the product of which is hauled to adjacent regions and burned for agricultural lime.

The outcrop of the series is characterized at numerous points by caverns of unknown extent, occurring presumably in the purer portions of the lime. Some of these have been explored for short distances but no systematic attempt, so far as known, has been made to penetrate them to any great distance. In the Dry Fork Valley it is reported that green vegetation from garden tracts on Mill and Elklick Runs has drifted through one of these openings to the cavern along the railroad just below Moore Siding, two miles or more distant from the source. The caverns which often occur in the upper portion of the Series, frequently have their effluents at the contact of the Greenbrier with the Pocono Sandstone Series just below it, the hard rocks of the latter being resistant to the action of water. A notable instance of this kind occurs at the Big Springs at a low gap on McGowan Mountain three miles southwest of Hendricks, where a strong stream of water flows from the base of the limestone. Another is at the spring along the Central West Virginia and Southern Railroad, just north of Moore Siding mentioned above.

## MEASURED SECTIONS, GREENBRIER SERIES.

In Chapter IV detailed measurements of all or a portion of the series are recorded in the sections for Backbone Mountain, Buena, Elklick, Flanagan Hill, Hendricks, Laneville, Laurel Run of Dry Fork, Otter Creek, and Parsons. In addition to these a very good exposure of almost the entire series is afforded by the following section, measured with aneroid and arranged in descending order by Dr. Price and the writer just west of Harman, on Dry Fork of Cheat, Randolph County, about four miles south of the Tucker County Line:

| | Thickness. Feet. | Total. Feet. |
|---|---|---|
| Shale, red, base of Mauch Chunk Series | ... | .... |
| Limestone | 1 | 1 |
| Concealed and shale | 19 | 20 |
| Limestone, shaly, with numerous small Crinoids | 20 | 40 |
| Shale, red, limy, with marine fossils in profusion | 5 | 45 |
| Limestone, shaly, numerous marine fossils (Crinoids and brachiopods) | 35 | 80 |
| Concealed, partly, with shale and sandstone | 23 | 103 |
| Limestone, hard, gray, with brachiopods | 2 | 105 |
| Sandstone and concealed | 30 | 135 |
| Limestone, hard, gray | 50 | 185 |
| Concealed | 20 | 205 |
| Limestone, hard, gray | 5 | 210 |
| Sandstone, flaggy | 5 | 215 |
| Concealed | 5 | 220 |
| Limestone, hard, gray | 10 | 230 |
| Concealed | 15 | 245 |
| Sandstone | 15 | 260 |
| Limestone, hard, gray, partly concealed | 50 | 310 |
| Concealed, with limestone, to Pocono contact (2345 B) | 75 | 385 |

In Chapter XIV, under the subject of "Limestone", will be found numerous descriptions of quarries in the Greenbrier, as well as chemical analyses and a discussion of its economic possibilities.

# CHAPTER X.

## STRATIGRAPHY---POCONO SERIES.

### GENERAL ACCOUNT, POCONO SERIES.

The Pocono Series, comprising the basal group of the Mississippian Period, and coming just below the Greenbrier Limestone and just above the Catskill Red Beds of the Devonian, is represented in Tucker County by outcrops that are extensive in linear rather than areal extent. In the western portion of the county, it is exposed along the eastern base of Laurel Ridge from the Preston County Line southward to Randolph County, and also around Limestone Mountain, where a considerable belt of it remains in the Hannahsville Syncline. Southwest of Limestone Mountain there are also a few isolated outcrops in the summits of some of the higher mountains along the same basin. East of Cheat River it occurs in a long narrow belt on the western slopes of Backbone and McGowan Mountains, extending entirely across the county from Preston to Randolph, its outcrop in the vicinity of Hendricks extending up Blackwater River nearly two miles and up Dry Fork one and one-half miles before going under drainage under the North Potomac Syncline. On Dry Fork River it rises above drainage again on the southeastern limb of the North Potomac Syncline one-fourth mile above Otter Creek and gradually ascends along the mountains on either side of the river, its base being several hundred feet above water-level at Jenningston. From the latter point eastward toward Red Creek, it descends toward the Stony River Syncline and goes under drainage three-fourths mile below Laneville. In the Canaan Valley it is brought above drainage again along the great dome in the Blackwater Anticline, its outcrop covering an area seven miles long and from 1 to 2 miles wide, after the form of an inverted canoe. With the exception of the latter locality, where the surface is fairly smooth, its outcrop is usually notable on account of the many steep and precipitous slopes or perpendicular bluffs, its heavy ledges being prominent on Blackwater River just above Hendricks and on Dry Fork above the same town.

In thickness the series in Tucker County represents a decadent phase, as compared to other portions of the State. In the oil fields farther west, where thousands of borings have penetrated its full extent, it varies from 400 to 500 feet, and in the eastern panhandle of the State, it is recorded by Dr. G. P. Grimsley as being almost 2,000 feet. In Tucker, however, it varies from a minimum of not more than 75 feet to a maximum of only 275 feet, the principal apparent thinning being in the lower portion.

In lithologic character it is composed of gray or brown sandstones, with intervening beds of gray, sandy and sometimes ferruginous shale, there being occasional streaks of coal too thin for mining. Of its sandstone members the principal ledge is a heavy conglomerate at the top of the series, varying from 50 to 100 feet in thickness, noticeable at nearly all points along its outcrop. From its position just below the Greenbrier Limestone, as well as from its pebbly, porous character, this ledge is believed to be the Big Injun Sand of the oil fields farther west. In contrast to the rough, angular pebbles of the Pottsville and other series of the Pennsylvanian, the quartz inclusions of the Pocono are smooth, oblong and much flattened by sliding friction, the difference being so well-marked that boulders of the two periods, placed side by side, may be easily distinguished by their pebbly content. Below the Big Injun, which is the main cliff-forming member of the series, the other sandstones appear to be lenticular, and, as a rule, only slightly conglomeratic, their exposure being often imperfect on account of the large amount of talus and debris from the upper ledge.

Marine fossils have been found only sparingly in the Pocono. At two localities on Laurel Ridge Dr. Price notes brachiopods in two sandstones coming approximately 30 to 90 feet, respectively, below the top of the series, and in Limestone Mountain he found them again in talus accumulations. Elsewhere in the State, so far as known, they have been found at only two localities. Dr. S. B. Brown reports them as occurring at Beaverhole on Cheat River, 8 miles east of Morgantown, Monongalia County, and the writer once observed them along the Morgantown Turnpike on the eastern slope of Laurel Ridge, 5 miles northwest of Elkins, Randolph County. They have also been noted at a few points in Pennsylvania and Virginia. From these infrequent occurrences we may infer that only slight incursions of the Paleozoic Sea took place while the Pocono beds were in process of deposition, and also that a great period of subsidence took place immediately following Pocono time, producing abundant marine life in the Greenbrier.

As an economic factor the Pocono Series of Tucker appears to be largely barren. Its sandstones do not have the even texture necessary for building stone and its shales are not of any known value. The soil along its outcrop is uniformly thin and poor. Its principal value in the county is as a support, or shoulder, to hold up and in part preserve from erosion many valuable acres of Greenbrier soil above it. In the oil fields farther west the sandstones of the series are valuable reservoirs for petroleum and natural gas but in a large part of Tucker their presence above drainage indicates that whatever content of these valuable fuels they may once have held has now been largely, if not entirely, dissipated by evaporation. Certain further deductions concerning their possibilities in this respect in the eastern portion of the county where the series is mainly buried under later sediments will be found in Chapter XII under the subject of "Petroleum and Natural Gas".

## MEASURED SECTIONS, POCONO SERIES.

In Chapter IV detailed measurements of all or portions of the Pocono are recorded in the sections for Backbone Mountain, Dry Fork, Elklick, Flanagan Hill, Hendricks, Laneville, Limestone Mountain, Parsons, Richford, and Texas, correlations with the oil sands of the western portion of the State being suggested in some cases.

## COAL EXPOSURES, POCONO SERIES.

The Pocono Series of Tucker County, in conformity with its well-known character in the central and western portions of the State, is almost totally barren of coal. Farther east in Morgan and Berkeley Counties, where the Pocono has a thickness of approximately 2,000 feet, there are impure deposits of anthracite coal which have never been mined successfully, although many attempts have been made. In Tucker the only coal noted in the series was observed in Dry Fork District along the public road west of Elklick Run of Dry Fork of Cheat River, 0.7 mile east of Elk Post-Office where a prospect was once made at an elevation of 2330′ B., coming approximately 40 feet above the base of the series. When visited by the writer this opening had fallen shut, there being fragments of black slate and coal on the dump and the thickness of the bed being reported as 0′ 8″ by Adam Phillips, guide. Elsewhere in the county none was observed, and as the full thickness of the series was studied at various points, it may be stated that economic beds are certainly absent in the region of its outcrop and that there is little possibility that coal of any consequence could be found in the eastern portion of the county where the Pocono lies under drainage.

# CHAPTER XI

## STRATIGRAPHY--DEVONIAN PERIOD.

### GENERAL STATEMENT.

That portion of Tucker County lying west of Backbone and McGowan Mountains, comprising nearly one-half its acreage, is largely covered by sediments of the Devonian Period. Along the summit and eastern slope of Laurel Ridge there is a fringe of Pennsylvanian and Mississippian beds and along a portion of the Hannahsville Syncline the same rocks are present. Farther east they reappear on the western slopes of Backbone and McGowan Mountains. All these occurrences have been described in previous Chapters. In the remaining portion of this region the Deer Park Anticline, with its numerous attendant minor folds on either side, has elevated the strata to such an extent that these recent beds have been removed by erosion, the evidence that they once extended entirely across the county being abundant.

In lithologic aspect the Devonian Rocks differ materially from those of the later groups. Heavy and massive conglomerates, coals, and limestones are absent, shales or shaly sandstones comprising the main bulk of the sediments. They include two series differing widely in appearance, the Catskill at the top being largely composed of red beds, and the Chemung, which follows it, being mainly greenish in color. The thickness of the two series ranges from 3,500 to 4,000 feet, approximately three-fourths of which is Chemung. The Portage Series, which lies below the Chemung, has not been definitely identified in the county, but it is present in Randolph County near the Tucker Line and its top may possibly be above drainage at a few points along the Deer Park Anticline.

## GENERAL ACCOUNT, CATSKILL SERIES.

The Catskill Series, coming at the top of the Devonian Period, and just beneath the Pocono Series of the Mississippian, occurs above drainage in several localities of the western portion of Tucker. In the northwestern corner it is generally present on the upper or middle slopes of the mountains of Licking and Clover Districts northwest of the line of strike passing through St. George, forming a continuous outcrop along the eastern base of Laurel Ridge, and it comprises, also, a considerable portion of the surface sediments along the Hannahsville Syncline, its position between these two localities being higher, owing to the presence of the Etam and other anticlines. Southeast of St. George there is a belt, 6 to 7 miles wide, passing across the county southwestward from Preston to Randolph, where the series has been entirely eroded on account of the uplift caused by the Deer Park and other anticlines. Farther southeast it outcrops again in a long strip, varying from one-half to one and one-half miles in width, extending along the western slopes of Backbone and McGowan Mountains from Preston to Randolph County, its red sediments being prominent in the vicinity of Hambleton and Hendricks and extending for short distances up the Blackwater and Dry Fork Rivers as shown by Map II. Beyond this strip it goes under drainage along the North Potomac Syncline, but on Dry Fork reappears about one mile below Richford on the northwestern flank of the Blackwater Anticline, almost its full thickness being exposed at Jenningston. Beyond the anticline, which crosses Dry Fork at Scotts Siding southeast of Jenningston, it descends toward the Stony River Syncline, going under drainage on Red Creek 1½ miles west of Laneville. In the entire northeastern portion of the county it is deeply buried under more recent sediments.

In thickness the series varies from 600 to 800 feet, there being a gradual increase from northwest to southeast, these figures being based on the view of Dr. Price that the earliest Catskill sediments occur just above the slightly fossiliferous zone coming approximately 100 feet above the Hendricks Sandstone. It is held by Dr. White, however, that the earliest appearance of red beds marks the true beginning of the Catskill, and as these occur in some parts of the county 500 feet below the Hendricks Sandstone, 600 feet below the upper fossil zone mentioned, their inclusion in the Catskill would make the series vary from 700 to 1400 feet, depending on whether fossil evidence or fundamental lithologic change be taken as the criterion. These transitional beds, which are partly red and partly olive green, disappear almost completely in the northwestern corner of the county, there being no reds of consequence below the Hendricks Sandstone in that region, so that whatever view may be held as to the true line of contact the Catskill can not exceed 700 feet in that locality.

In lithologic aspect the Catskill is mainly composed of alternating beds of red shale and red or brown, fine-grained, micaceous sandstone. In the northwestern portion of the county the sandstones are extremely shaly, often being merely interlaminations between the shales. Farther southeast they gradually become massive and along the exposure of the series on Dry Fork north of the Blackwater Anticline the middle and lower members make huge cliffs, 50 to 100 feet thick, the upper beds still retaining their shaly nature. In the shale members there are frequent occurrences of pale-green stratified beds, from which presumably the iron content of the shale has leached out, their thickness varying from a few inches to a few feet. They occur at irregular intervals throughout the series and are probably superficial only, positive evidence as to their existence underground being lacking. Most of the shales of the series have an angular cleavage, laminated or fissile beds being rare. Their red color is due to the presence of ferric iron, indicating that aerial conditions largely prevailed during their deposition. Floral remains of distinguishable character are almost entirely lacking and if the view of Dr. Price as to the base of the series be accepted there is a total absence of marine fauna.

In topographic expression the series is usually weathered into rounded slopes that are concave outward, somewhat after the manner of an inverted basin and the ridges have the appearance of an inverted canoe, in sharp contrast to the typical topography of the Chemung which makes sharp, angular ridge summits and slopes with a straight line profile.

As an economic factor the series offers little to the community in which it outcrops, its principal function being that of a soil maker. Its weathered surface is usually tilled with ease, owing to the great proportion of shale and the smooth slopes but the soil is somewhat poor, being deficient in lime and phosphoric acid. When these agents are added in quantity a marked improvement in crop yield invariably occurs. The sandstones are nearly always too shaly for use as building stone and the shales are probably too siliceous for successful use in making brick or other earthenware. A sample (423R) collected from a shale member 40 to 50 feet thick near the top of the series along the Backbone Mountain road two miles east of Leadmine, having a basal elevation of 2660′ B., has the following analysis, according to Hite and Krak:

| | Per cent. |
|---|---|
| Silica ($SiO_2$) | 67.79 |
| Ferric Iron ($Fe_2O_3$) | 6.36 |
| Alumina ($Al_2O_3$) | 14.52 |
| Lime ($CaO$) | 0.66 |
| Magnesia ($MgO$) | 1.08 |
| Potassium ($K_2O$) | 2.79 |
| Sodium ($Na_2O$) | 0.73 |
| Titanium ($TiO_2$) | 0.63 |
| Phosphoric Acid ($P_2O_5$) | 0.10 |
| Moisture | 1.55 |
| Loss on ignition | 3.48 |
| Total | 99.69 |

It is possible that a shale of the above character could be utilized for brick manufacture if it were mixed half and half with some of the fire clays from the coal measures of the North Potomac Basin which have a much higher content of alumina, but the added expense of transportation and mixing would probably leave only a small margin of profit for the manufacturer. The Catskill shales are available in great quantity along the Western Maryland Railway near Hendricks, however, and the clays of the coal measures occur farther east along the same line.

The possibility of petroleum and natural gas in the Catskill Series in the eastern portion of the county will be discussed in Chapter XII.

## MEASURED SECTIONS, CATSKILL SERIES.

In Chapter IV all or portions of the Catskill Series are recorded in the sections for Dry Fork, Elklick, Hendricks, Jenningston, Limestone Mountain, Parsons, Richford, and Texas. These sections reveal the main lithologic characteristics of the members. Owing to the absence of any fossil fauna and distinguishable flora, as well as the lack of any peculiar lithologic characteristics, it has not been possible to differentiate the beds in the county, although their possible correlation with the oil sands of the western portion of the State has, in some cases, been indicated.

## GENERAL ACCOUNT, CHEMUNG SERIES.

The Chemung Series of the Devonian, coming just below the Catskill, forms a large proportion of the surface rocks of western Tucker. It outcrops widely in Licking, Clover, St. George, and Black Fork Districts, there being a belt 6 to 7 miles wide extending from Preston to Randolph County, along the great uplift of the Deer Park Anticline and its attendant minor flexures where no other surface rocks except the Quaternary river deposits are present. At a distance of two to five miles west of the Deer Park Anticline, the series in certain localities is capped by more recent deposits, as heretofore described. East of the western slopes of Backbone and McGowan Mountains, it is entirely under drainage, being covered by large deposits of later rocks.

In thickness the series varies from 2,500 to 3,000 feet, depending on whether its top be assigned to the highest marine beds of the Devonian or the basal red beds characteristic of the Catskill, as previously mentioned. It contains a profusion of marine fauna, prevalent throughout the entire portion lying below the uppermost red beds, their occurrence being so general and wide-spread that definite correlation, or tracing, of individual beds seems impossible.

In lithologic aspect the series is mainly composed of alternating deposits of olive-green shales and sandstones of the same color. The shales are mostly laminated and often weather into small "pencil" strips, three to eight inches long, with a rhomboidal cross-section, but occasional slickensided deposits, with irregular cleavage, may be seen. The sandstones are extremely fine-grained and hard, usually varying from two inches to one foot in thickness, and weather into rectangular or rhomboidal blocks, the sharp edges of which retain their clean angles for a long period of time, making automobile traffic expensive along roads where they occur in quantity, owing to their cutting action on rubber tires.

In topographic expression the Chemung almost invariably forms extremely sharp ridges and very steep slopes with a straight line profile, due to the many thin bands of hard sandstone which prevent the interlaminated shales from being more rapidly eroded. Owing to the usual absence of thick sandstone, pronounced benches seldom occur.

As an economic factor the series is almost entirely barren. It contains no coal, limestone, iron ore, or other deposits of known value, and its yellow soil is unusually poor and difficult to till, both on account of the steep slopes and the many blocks of small sandstone. In some localities along the Deer Park and other anticlines there is a slight mineralization of lead ore in the fissures, as will be described in Chapter XV, but they are not of sufficient extent to have commercial possibilities.

## MEASURED SECTIONS, CHEMUNG SERIES.

In Chapter IV various exposures of the Chemung Series are recorded in the sections for Auvil, Bull Run, Clay Run, Hambleton, Hardesty, Parsons, Pettit, Redhill Church, and Right Fork of Bull Run. These sections reveal the typical characteristics of the members, most of which can not be differentiated either on paleontologic or lithologic evidence. Certain members, occurring in the transitional zone of partly red and partly green sediments at the contact between the Catskill and Chemung, however, have been traced throughout most of their outcrop, and their description, as prepared by Dr. Price, follows, together with a discussion of the Portage Series.

## DESCRIPTION OF MEMBERS, CHEMUNG SERIES.

By W. Armstrong Price.

The upper portion of the Chemung in Tucker County is variable in its lithology and fossil content. In the Deer Park anticlinal zone a tongue of red sediments of Catskill type from 300 to 400 feet in thickness invades the Chemung from the east. This tongue is complex, being composed of a number of smaller tongues of varying thickness and varying westward extent. These red tongues disappear in the anticlinal zone west of the Limestone Mountain Syncline where gray, fossiliferous sandstones and conglomerates occupy the whole of the upper portion of the series with only an occasional thin bed of red shale at or near the top. These upper sandstone and conglomerate beds send out lateral tongues to the east where they are interpolated between the beds of the red tongue. These eastward extensions of the marine Chemung become less and less fossiliferous and gradually lose their content of quartz pebbles and become more and more attenuate eastward, many disappearing before the slopes of Backbone and McGowan Mountains are reached.

### HENDRICKS SANDSTONE.

The most prominent member of this group of marine tongues is a fossiliferous sandstone, conglomeratic in the west, fine-grained in the east, which has been called the Hendricks Sandstone, from its exposure one mile northeast of the town of Hendricks in Black Fork District on the point of the ridge east of the mouth of Falls Run, at an elevation of 1815 feet above sea, in the highway leading from the town of Hambleton along the western slope of Backbone Mountain and over the mountain to Douglas in Fairfax District. Here the sandstone is 6 feet in thickness and layers of it are crowded with **Camarotoechia contracta** Hall, small Y-shaped bryozoan stalks, pelecypoda, and **Lingula oherni.**

The following section was measured here:

Section, descending, at Locality 223, at mouth of Falls Run, beginning at the top of a small knob on the ridge south of Falls Run and 0.15 mile east of the mouth of the run and descending the ridge to the public road at an elevation of 1815 feet (barometer) above sea. Type locality of Hendricks Sandstone. Measurements by tape and hand-level. Traverse, N. 50° W. Calculated dip, 6½° S.; observed dip, 10¼° S. Strike, S. 33° W.

| | Horizontal Distance. Feet. | Vertical Thickness. Feet. | Stratigraphic Thickness. Feet. |
|---|---|---|---|
| 1. Sandstone, red, with yellow nodules of iron oxide and thin shale lenses; cross-bedded; the top of this unit is weathered into a "chimney" forming the top of a small knob on the ridge...... | 62 | 41 | 43.0 |
| 2. Sandstone, gray, fine-grained.... | .. | .. | 5 |
| 3. Shale, red, containing lenses of calcareous sandstone with Hendricks Sandstone fauna........ | .. | .. | 7 |
| 4. Sandstone, **Hendricks**, evenly bedded, weathering thin-bedded; much iron oxide with pebbles of green shale at base; ripple-marks on upper surface; fossiliferous throughout; **Camarotoechia**, aa, **Lingula**, bryozoa, aa, Pelecypoda, aa................ | .. | .. | 6 |

The horizon of this bed was seen on the ridge between Roaring Run and Falls Run and at two other points in the valley of Dry Fork of Cheat River between Parsons and Hendricks; at water-level at the mouth of Elklick Run opposite the town of Hambleton, a section measured at this point having been described on a preceding page, and at an elevation of 2038 feet above sea-level in a secondary road which ascends the northeastern extremity of Fork Mountain at a point 1.0 mile S. 18° W. of the top of Turkey Knob. At this place its horizon was located, apparently within a few feet of its proper position, by loose blocks of the fossiliferous sandstone at the side of the road. These four locations have furnished a close control of the structure at this point and it is from these data that the stratigraphic position of this bed in relation to the top of the Pocono Series was determined.

The Hendricks Sandstone fauna was traced throughout the extent of the Chemung outcrop in Tucker County. It furnished a datum plane for the determination of the minor folding and aided in drawing the Chemung-Catskill contact and in determining the thickness of the Catskill Series. The outcrop of the Hendricks Sandstone is shown on Map II. The horizon of this bed appears to be below drainage in Tucker County in the Devonian area along the Blackwater Anticline which passes through Jenningston.

**Distribution of the Hendricks Sandstone.**—Southwest of the type locality along the slopes of Fork and McGowan Mountains in Black Fork District, this sandstone was observed at only two places. Loose blocks of the fossiliferous sandstone were found near the top of Fork Mountain in a steep drain which ascends the mountainside opposite Porterwood. The horizon appears to be at an elevation of about 2650 feet above sea-level. In a trail in the edge of Randolph County along a small run which empties into Shavers Fork of Cheat River from the southeast at the southernmost point of the loop of the river which lies immediately north of the Randolph County Line, blocks of the sandstone were found at an elevation of 1865 feet above sea-level and 35 feet above the tracks of the Porterwood Lumber Company Railroad. Twenty feet below the apparent position of the horizon of the sandstone a small seepage of water was noted. The presence of a spring from 15 to 30 feet below the sandstone was noted at many places and assisted in determining the true horizon where the outcrop was not found in place.

North of Hendricks along the western slope of Backbone Mountain in Black Fork and St. George Districts, the Hendricks Sandstone was located at numerous points. Its horizon may be readily located on ridges between the small streams which trench the mountainside. On these ridges a series of heavy sandstones in the middle portion of the Chemung forms a prominent knob overlooking the valley of Horseshoe Run. On the back slopes, or cuestas, of these knobs, white weathered blocks of the fossiliferous sandstone are readily located in fields and along roads about half-way between the top of the knob and the lowest point of the saddle below the next succeeding knob which is formed by the prominent and well-forested outcrops of the Pocono Series. Typical of such locations is the ridge known as Close Mountain which projects from the sides of Backbone Mountain just south of the village of Leadmine. Abundant blocks of the fossiliferous sandstone were found by D. B. Reger at the roadside about 100 yards east of the Close Mountain School. It was at this locality that the sandstone was first found. It occurs at an elevation of 2575 feet above sea-level in the Parsons-Davis road on Backbone Mountain above Leadmine village. A few pebbles of quartz were found in it at the headwaters of Leadmine Run; elsewhere on the east side of the Deer Park Anticline, it is lacking in conglomerate pebbles.

Outcropping around the Hannahsville Syncline in St. George and Licking Districts, the Hendricks Sandstone fauna occurs in the midst of a 35-foot bed of gray and brown sandstone with layers of conglomerate. In most places the matrix of the fossils is conglomeratic, usually coarse and weathers black. The black color is apparently due to iron oxides or hydrates.

In western Licking District and in Pifer Mountain in northwestern Clover District, the conglomerate weathers gray or white. These conglomerate boulders are prominent on hillsides and in stream bottoms below the outcrop west of the Deer Park Anticline and are second only in prominence to the conglomerate boulders which descend from the Pocono ledges.

The Hendricks Sandstone was noted in Licking District along the crest and upper slopes of the long ridge west of Mill Run. It crosses this ridge near the Preston County Line, 0.4 mile south of White P. O., and descends into Cheat River drainage along Block Run. It is exposed in the runs which enter Cheat River from the west of where it flows along the base of Limestone Mountain from the Preston County Line to the mouth of Bull Run. It outcrops up these runs short distances above their mouths. It outcrops on the west side of Cheat River in Clover District at the side of the public highway 0.25 mile south of the ford at the mouth of Bull Run. Here its elevation is 1540 feet above sea-level. From this point southward it climbs steadily toward the hilltops and is last found facing Cheat River at an elevation of 2450 feet in the top of the knob 0.7 mile south of Auvil.

In northwestern Clover District its outcrops are exceedingly numerous. Along the top of Pifer Mountain and the higher ridges radiating from it, some of which join Laurel Ridge to the west, the broad, almost flat-topped uplift made by the Etam Anticline and the Texas Anticline, the Hendricks Sandstone is found along the tops of the ridges, in high knobs and descending the stream valleys to the west toward Laurel Ridge. It descends into Indian Fork at Right Fork of Clover Run and into the headwaters of (Upper) Jonathan Run where the axis of the Hannahsville Syncline crosses these streams. Finally, it outcrops along the foot of Laurel Ridge in Clover District southward from Texas to the Randolph County Line and northward from the headwaters of Brushy Fork of Teter Creek in Licking District to the Preston County Line.

On Pifer Mountain it may be well seen in the high knob at the Pifer Church where it outcrops along the road and around the knob from elevations of 2640 at the road forks west of the church to 2725 feet just east of the church. A half-mile west of the church in the road in front of the residence and store of Mr. Shaffer, the sandstone outcrops in a steeply dipping, gray, conglomeratic ledge.

The Hendricks Sandstone was traced across the Hannahsville Syncline in Preston County as far north as Erwin at the mouth of Little Wolf Creek where it outcrops on the top of a low knob 0.3 mile south of Erwin at an elevation of 1675 feet above sea-level. It was located in the mouth of a small run on the south side of Cheat River 1.6 miles east of the Pleasant Valley ford of the river at 1525 feet above sea. It was located on the B. & O. R. R. grade one mile west of Rowlesburg at 1840 feet above sea, 0.1 mile west of an unnamed run. This appears to fall in the topmost member of the Chemung Series in the Rowlesburg Section of Hennen and Reger[1] in the 50-foot bed of sandstone between 2201 and 2251 feet below the top of the section. The section measured at this point by the writer is given below:

[1]W. Va. Geol. Survey, Report on Preston County, p. 100; 1914.

**Section of Portions of the Chemung and Catskill Formations** exposed in the cut of the B. & O. R. R. grade extending from the northwestern end (elevation, 1480′ B.) of the fill over the run entering Cheat River **one mile west of the mouth of Saltlick Creek (Rowlesburg)** northwestward to the fill (elevation, 1500′ B.) over a small ravine at a small house provided for the "section-hand" of Section 47, B. & O. R. R.; measurements made with tape, thickness of strata measured direct; ascending:

| | | | Beds. Ft. In. | Total. Ft. In. |
|---|---|---|---|---|
| 1. | Shale, dark-gray | | 8 0 | 8 0 |
| 2. | Sandstone, **Hendricks**, marine, conglomeratic: | | | |
| | Sandstone, gray to brownish-gray, micaceous, laminated, weathering flaggy | 5′ 0″ | | |
| | Sandstone, gray to brown, micaceous, ferruginous, conglomeratic, containing nodules of iron oxide and flat, oval pebbles of clear to milky quartz, pebbles often broken across along joint-planes, strand-markings on bedding-planes; weathering yellow and containing abundant marine fossils; **Camarotoechia contracta**, a; **Cladochonus humilis**, a; pelecypoda, c; | 2 0 | | |
| | Sandstone, light-gray, fine-grained, massive, laminated at top, with some small quartz pebbles, micaceous, and containing flakes of carbonized wood; **Camarotoechia contracta**, a; | 2 6 | 9 6 | 17 6 |
| 3. | Shale, gray, with some sandy layers; near top a thin sandstone lentil containing vertical tubular algal (?) molds (**Rhizomorphs**) | | 4 8 | 22 2 |
| 4. | Sandstone, light-gray, fine-grained, cross-bedded, some layers weathering flaggy. In base a thin layer of conglomerate consisting of quartz pebbles, flat shale fragments, and nodules of iron oxides; base undulating | | 21 0 | 43 2 |
| 5. | Shale, gray | | 4 0 | 47 2 |
| 6. | Shale, and shaly sandstone, red and green | | 4 0 | 51 2 |
| 7. | Sandstone, red at base, mottled green and red above; algal markings at base | | 21 0 | 72 2 |

| | | | Beds. Ft. | Beds. In. | Total. Ft. | Total. In. |
|---|---|---|---|---|---|---|
| 8. | Sandstone, white to yellowish, with a pink tinge at base, fine-grained...... | | 16 | 0 | 88 | 2 |
| 9. | Shale, dark-gray........................ | | 10 | 0 | 98 | 2 |
| 10. | Sandstone: | | | | | |
| | Sandstone, light-green, with shale fragments ............. | 1′ | | | | |
| | Sandstone, light-gray, fine-grained, laminated ................ | 26 | | | | |
| | Sandstone, red, fine-grained, massive, with crystalline travertine in joint-cracks.......... | 11 | 38 | 0 | 136 | 2 |
| 11. | Shale, red ............................ | | 3 | 0 | 139 | 2 |
| 12. | Sandstone: | | | | | |
| | Sandstone, greenish, argillaceous, calcareous (?)......... | 0′ 5″ | | | | |
| | Sandstone, red, argillaceous, weathering shaly at base..... | 4 5 | | | | |
| | Sandstone, light-gray, shaly..... | 2 0 | 6 | 10 | 146 | 0 |
| 13. | Shale, gray............................ | | 3 | 0 | 149 | 0 |
| 14. | Shale, red, containing some thin sandstone layers ........................ | | 8 | 0 | 157 | 0 |
| 15. | Sandstone, greenish, shaly, calcareous (?) | | 1 | 0 | 158 | 0 |
| 16. | Shale, green .......................... | | 1 | 0 | 159 | 0 |
| 17. | Sandstone, massive, forms base of exposure in cut above small ravine containing house of "section-hand"........... | | | | | |
| 18. | Alternating red sandstone and red shale of the Catskill Formation[2]. | | | | | |

[2] In the opinion of the writer, we have not yet made a sufficiently wide detailed study of the Catskill and Chemung beds in West Virginia to be able to decide definitely exactly where the dividing line between these two formations should be drawn. The introduction of red sediments after their entire absence through many thousand feet of strata from Salina time to Catskill is an event of such great importance in geologic and physiographic history that it might very well be taken as marking the beginning of a new (Catskill) geologic cycle in the earth's sedimentary history, and hence, as no red beds occur below the Hendricks Sandstone in the regions between Rowlesburg and Parsons, the writer is of the opinion that with our present limited study of the Catskill and Chemung beds of northern West Virginia, the separating line between the two should (subject to future correction) be drawn at the top of the Hendricks fossiliferous, conglomeratic sandstone of Reger and Price which correlates closely with the Elizabeth Sand of the Pennsylvania oil and gas group which has always been regarded by the writer as the true top of the Chemung beds. The Hendricks Sandstone is the one struck at 2888 feet in the well drilled by J. M. Guffey near Newburg, Preston County, the record of which is given on pages 89-92 in the West Virginia Geological Survey Report by Hennen and Reger on Preston County. (I. C. W.).

**Intertonguing of marine sandstones and Catskill red shales in Upper Chemung.**—As is usually the case in the Appalachian region the contact of the Catskill and Chemung types of sediments is not an abrupt line in any one area but consists of alternations of the two types at many places through a thickness of hundreds of feet. A study of the Hendricks Sandstone and its associated gray sediments has shown that these alternations of the two types of sediments are due to the overlapping of lateral tongues of red and gray sediments, the gray extending eastward from a thickened marine section and the red extending westward from deposits of red shales in the east. Stephenson[3] has introduced the term "tongue" to apply to such lateral extensions of one type of sediment into another. He has urged the mapping of such tongues when they are of sufficient thickness. In the present case time was not available to determine with sufficient completeness for mapping the thickness of these tongues at all points in the county. The top of the Chemung has been placed at the highest occurrence of marine fossils and the tongue of red sediments included in the Chemung. This tongue of Catskill sediments varies in thickness from 540 feet on Shavers Fork of Cheat River southeast of Pheasant Run to 350 feet at the south end of Limestone Mountain, to 300 feet just west of the mountain in Licking District, and 100 feet in the far western corner of the district. Here no reds appear below the Hendricks Sandstone except locally one or more thin beds. On Pifer Mountain the gray sandstones and conglomerates occupy the whole interval to the top of the Chemung and the invading tongue of Catskill sediments has entirely disappeared. In places thin red beds appear in the dominantly gray and yellow marine beds for 100 to 220 feet below the base of the prominent red tongue. Thus, near Pettit, red beds are found as much as 760 feet below the top of the Chemung Series.

The tongue of marine Chemung is at its thinnest at the type locality of the Hendricks Sandstone and along the eastern side of the Deer Park Anticline. Here it is composed of the Hendricks Sandstone, 6 feet in thickness and a few other gray

[3]Stephenson, L. W., 1917, "Tongue, a new stratigraphic term", Washington Acad. Sci., Jour., Vol. VII, No. 9.

sandstone beds, the thickest of which appears to be a group of gray and green sandstones and shales and conglomerates below the Hendricks Sandstone and separated from it by 50 feet of red sediments. Another group of gray strata 15 feet thick lies approximately 100 to 150 feet above the Hendricks Sandstone. This group, composed of sandstone and conglomerate beds, appears to be the same as the conglomerate bed, loose boulders from which are scattered along the top of Fork Mountain.

These beds are well exposed in the mouth of a small run which enters Shavers Fork of Cheat River from the east at a point in Black Fork District 0.7 mile S. 45° E. of the town of Pettit in Randolph County. This conglomerate contains nodules of iron oxide and fragments of bluish, phosphatic (?) material resembling fish remains. It appears to be the same which at other places is known to contain shells of **Lingula oherni.** This is the highest bed found to contain marine fossils in the Chemung in Tucker County and its top has accordingly been designated as the top of the Chemung Series.

The total thickness of the several tongues of Chemung which are included between the tongues of red sediments is here very small.

West of the Deer Park Anticline these Chemung tongues gradually thicken, becoming more conglomeratic, and others appear. The Hendricks Sandstone tongue thickens to 35 feet in the edge of Preston County on the eastern limb of the Limestone Mountain Syncline.

Finally in western Licking District and along the Etam Anticline where the red has nearly disappeared, the Chemung gray sediments extend for 90 to 160 feet above the Hendricks Sandstone.

## Thickness of Chemung Series.

Below the Hendricks Sandstone, there appear to be no recognizable lithologic units or definite faunal horizons in the Chemung Series which can be traced across the area of Tucker County. This fact has made it difficult to obtain measurements of the thickness of the series. In the lower Chemung, however, **Spirifer disjunctus** is of rare occurrence and **S. mesacostalis** becomes prominent and in many sandstone strata its shells are very abundant. In this lower portion are found also **Camarotoechia congregata** var. **parkheadensis** which is abundant in some shaly beds and many coquina-like beds of **Ambocoelia umbonata.** At two horizons in this lower portion of the series were found many tiny cones of **Tentaculites.** Many beds of purplish-red shale and sandstone are also found here. Associated with this fauna are shells of one or more species each of the genera **Douvillina** and **Dalmanella** which demonstrate by their presence that it is a Chemung fauna.

This fauna appears to occupy the lower 700 or 800 feet of the Chemung. Its top is in many cases indefinite but it has been roughly traced and its approximate upper limit has been determined on several of the tributaries of Horseshoe Run: viz, on Twelvemile Run, Hyle Run, and Mile Run; also at St. George, Parsons, Porterwood, at the mouth of Indian Fork of Left Fork of Clover Run, and in a high hill on the Randolph-Tucker Line at the head of Valley Fork of Left Fork of Clover Run.

From measurements made at the head of Valley Fork and in the Parsons-Hendricks section, the Chemung appears to be approximately 3100 feet thick. For lack of other determinations of the thickness of the Chemung, it has been assumed that the total thickness of the combined Chemung and Catskill Series in Tucker County west of the Upper Potomac basin is constant. The combined thickness of these two series at Parsons was determined to be 3600 feet and this figure has been used for western Tucker County as delimited above.

### CHEMUNG-CATSKILL CONTACT.

The top of the Chemung, as stated above, was fixed at the top of a conglomeratic sandstone which appears in the section from 100 to 170 feet above the Hendricks Sandstone. In most places it contains indistinct fragmentary phosphatic remains which resemble fish teeth or pieces of the shells of **Lingula.** Crinoids, bryozoa, and **Lingula** are found in it in some places. These conglomerate beds may not all lie at the same horizon but appear to be constantly present approximately within the limits stated. This conglomerate was noted along the top of Fork Mountain, in the Miller Hill, at several points just west of Limestone Mountain, and at many places in Pifer Mountain and the adjoining ridges. It also appeared a few feet above the Dry Fork of Cheat River along the crest of the anticline at Jenningston at an elevation of 2065 feet above sea and 6 feet above the railroad grade at the mouth of Laurel Fork of Dry Fork of Cheat River. Here its outcrop encloses a small area of Chemung strata.

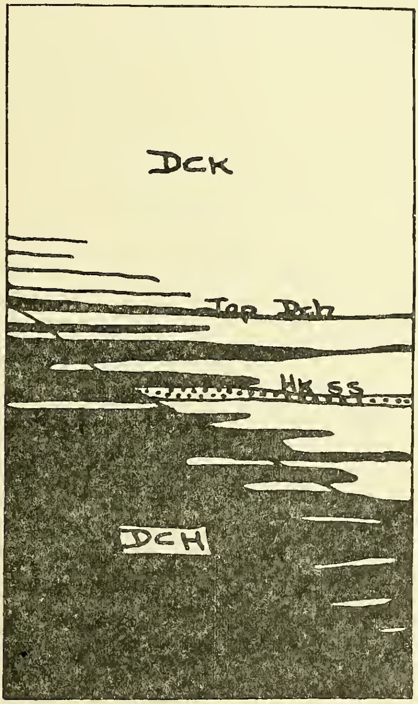


Figure 4.— Chart showing tongues of red and green sediments at Catskill—Chemung contact.

The contact as thus chosen is difficult to determine in the field and requires a close search, increasing the difficulty of mapping. However, it was found when the attempt was made to map the contact by the appearance of the lowest prominent red sediments that the results were extremely variable and had no stratigraphic significance.

## GENERAL ACCOUNT, PORTAGE SERIES.

### By W. Armstrong Price.

**Absence of Parkhead and Woodmont faunas.**—In Maryland east of Cumberland (?) there is a great series of sandstones and shales beneath the Chemung Series containing the faunas of the Parkhead and Woodmont members of the Portage Series. These faunas were not discovered in Tucker County, the typical Chemung fauna descending along the axis of the Deer Park Anticline to its lowest stratigraphic point within the area of the county. However, in New Interest District, Randolph County, in the valley of Leading Creek and approaching within 0.5 mile of the Tucker County Line on the divide between Haddix Run and Valley Fork of Left Fork of Clover Run, are exposed soft shales which are almost totally devoid of marine fossils and which are taken to be the shales of the Portage Series, probably the upper barren division of the Woodmont, and may contain a part of the barren Parkhead shales. It is, however, apparent that fossiliferous Parkhead Sandstones, which are known to be mainly eastern in origin, which consist largely of Hamilton species, and which in Maryland become gradually thinner and less sandy toward the west, are absent or represented by a very thin zone which was not observed in the great thickness of fossiliferous sandstones of the Chemung. If a Parkhead fauna does reach Tucker County it is to be sought in the more deeply eroded portions of the Deer Park Anticline where it is crossed by Cheat River at the mouth of Horseshoe Run.

**Description of Members.**—The upper portion of the Portage only was examined. This consists of soft shales some of which are black when weathered as seen in the cut of the Western Maryland Railroad in the northern end of Elkins. They contain also considerable amounts of green and brown shales. The shales weather white, gray, yellow, and light greenish yellow. Some sandstones are seen near Elkins but

PLATE XI.—Looking southwest up Coal Run of Otter Creek toward Green Mountain. High cliffs on rim of plateau are Homewood Sandstone. Greenbrier Limestone visible in wooded bluff along Dry Fork River in foreground. Main slopes formed by Pottsville and Mauch Chunk. Mouth of Otter Creek visible at right center.

they are present in very subordinate amounts. These weather into blocks of white, yellow, and gray colors and are often abundantly covered with strand-markings. No fossils were found in this shale except near Elkins where a single gastropod and a few minute crinoid stems were found.

This shale is readily eroded and has permitted the rapid broadening of the valley of Leading Creek. The upper slopes of the valley are formed by low hills with gentle slopes and small, symmetrical, convex knolls.

**Portage-Chemung Contact.**—At the base of the Chemung the topography suffers a sharp break. Above the gentle slopes of the Portage are rough hillsides and the narrow, V-shaped valleys of the smaller streams. These hillsides rise abruptly to the summits of Pheasant Mountain and Laurel Ridge which together form a semicircular ridge—with a diameter of 5 miles—surrounding the head of Licking Creek.

In the lower Chemung Shales marine fossils appear rather abruptly. The lowest fossiliferous strata are thin reefs of **Ambocoelia umbonata** in blocky, yellow sandstones. A short distance above these appear green and black shales with an abundant lower Chemung fauna containing **Camarotoechia congregata** [var. **parkheadensis** (?)] **Spirifer mesacostalis** and **S. marcyi** var. **superstes** are conspicuous. **Douvillina cayuta**, and **Dalmanella** sp. are also found proving this to be a Chemung fauna.

# PART III.

## Mineral Resources.

## CHAPTER XII.

## PETROLEUM AND NATURAL GAS.

### GENERAL STATEMENT.

Tucker County lies 30 miles or more east of the main oil- and gas-producing belt of the State, its distance from the nearest productive oil field, at Shinnston, Harrison County, being approximately 24 miles, and from the nearest producing gas field, in western Barbour County, approximately 16 miles. Small shows of gas have been found, however, in Randolph and Barbour Counties not far from the Tucker Line and a show of oil was obtained in the latter county, at Nestorville, only five or six miles west of the Barbour-Tucker Line. Between the main producing fields and the Tucker Line, several deep tests have been drilled, none of which produced oil or gas in commercial quantity. In Tucker one deep test has been made, finding no oil, but two or three shows, or pockets, of gas. Southeast of the county one well has been drilled, its location being in northern Pendleton County and its result having been inconclusive, owing to its location on nearly vertical strata, and to its abandonment at a comparatively shallow depth. As a prospective oil or gas region Tucker County is favored by its geologic structure, there being well-defined anticlines and corresponding deep synclines, indicating that any liquid hydrocarbons formed at an early age in the rocks must have been fully segregated into pools. It is further favored by the presence of the Pennsylvanian, Mississippian, Devonian, Silurian, and Ordovician Rocks, the shales and limestones of which are known to contain abundant vegetable and animal remains from which oil and gas are admittedly distilled, and the sandstones and the sometimes dolomitic limestones of which provide porous reservoirs for their accumulation. In many other fundamental conditions, however, the county is lacking. Throughout nearly all the western half the Pennsylvanian, Mississippian, and upper Devonian beds that produce oil and gas in abundance in the western part of the State have been elevated too high and their principal sands eroded, and, owing to their exposure to the atmosphere along the western sides of Backbone and McGowan Mountains, it might well be possible that whatever oil or gas may have been formed in the eastern part of the county has been entirely dissipated through surface evaporation.

A further condition of vital importance is that the folding which formed the Alleghany Mountains has been so severe that incipient metamorphism has taken place, which, with its attendant great heat and pressure, may have completely volatilized the hydrocarbons, causing their escape from the rocks in gaseous form. Through the studies of Dr. David White[1], Chief Geologist, United States Geological Survey, it has been definitely established that oil is seldom found in regions where the coals have extremely low volatile and high carbon content, and that gas in such localities is less abundant than in areas where the relative percentage of carbon is less, the explanation being that the analysis of the coal reveals the extent to which metamorphism has advanced and provides a criterion by which

[1]David White, "Some Relations in Origin between Coal and Petroleum," Wash. Acad. Sci., Vol. V, No. 6, March 19, 1915, pp. 189-212: and "Late Theories Regarding the Origin of Oil," Bull. Geol. Soc. Am., Vol. 28, Sept. 30, 1917, pp. 727-734.

the same process in the petroleum hydrocarbons may be roughly measured. In a more recent study of the oil fields of West Virginia by the writer[2], is has been shown that oil is found in the State principally in regions where the carbon-ratio of the coals is less than 60, there being a few good pools between 60 and 65, and that gas in quantity has seldom been found where the carbon ratio is above 70, this ratio being determined by dividing the fixed carbon of any proximate coal analysis by the sum of the fixed carbon and volatile matter of the same analysis, which gives the total carbon contained in any coal on a moisture- and ash-free basis.

In order to determine the carbon-ratios of the coals of Tucker County and to arrive at a conclusion as to the degree of metamorphism of its rocks Figure 5 has been prepared, showing the carbon-ratios of the county, as determined from the principal lower coals of the Allegheny and Pottsville Series, and from these percentages isocarbs, or lines of equal carbon, have been drawn. The figure, as thus prepared, indicates that the carbon-ratios of the county are entirely above 65 and that its rocks are presumably too much metamorphosed to have preserved any large content of oil, if the results obtained elsewhere in the State may be taken as valid evidence. It will be noted from the figure that the western half of the county lies below isocarb 70 and is therefore within limits where commercial gas has been found. In this region, unfortunately, the principal productive sands of the State have been eroded and the rocks remaining are much fissured and broken, so that the presence of gas in the lower Devonian, Silurian, and Ordovician must be considered as doubtful.

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[2]David B. Reger, "Carbon Ratios of Coals in West Virginia Oil Fields", Am. Inst. Min. & Met. Engrs., New York Meeting, February, 1921.

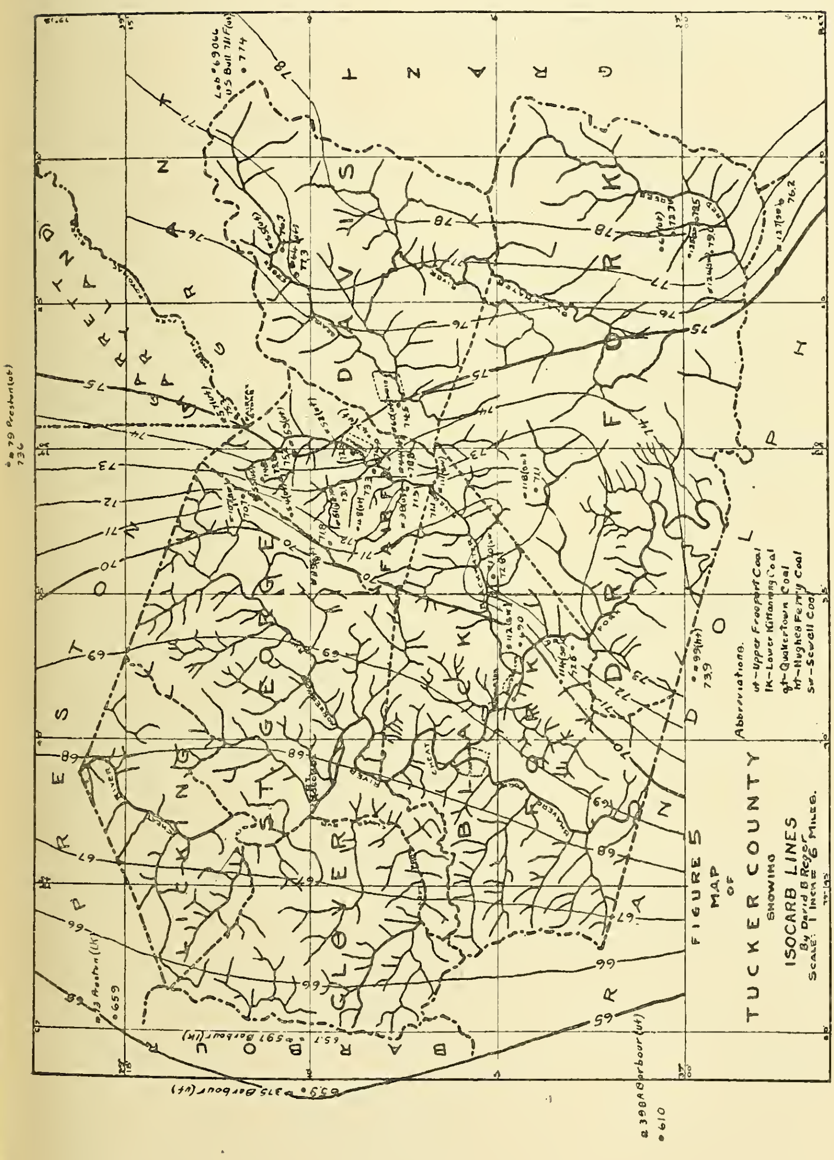


FIGURE 5
MAP OF TUCKER COUNTY SHOWING ISOCARB LINES
By David B Reger
SCALE: 1 Inch = 6 Miles.

In spite of the several unfavorable features outlined above the writer believes that a discussion of the oil and gas sands of the county, and an outline of its most favored localities from a structural standpoint, may be of value.

## OIL AND GAS HORIZONS.

The following classification of the various oil and gas sands of the State, taken with slight revisions from former Reports of the Survey, gives the productive horizons of other counties, and some that have produced oil in northwestern Pennsylvania and that have made shows of gas or oil in certain of the northern West Virginia counties, as well as the deeper horizons of Ohio and Kentucky that are now being sought for at great expense in the northern part of the State, the titles in use by the drillers being first mentioned, followed in most cases by their recognized geologic equivalents:

### Oil and Gas Horizons of West Virginia.

| | |
|---|---|
| **Pennsylvanian:** | |
| Monongahela Series | Carroll Sand (Uniontown) |
| Conemaugh Series | Minshall Sand (Connellsville) |
| | Murphy Sand (Morgantown) |
| | Moundsville Sand (Saltsburg) |
| | First Cow Run (Little Dunkard) Sand (Buffalo) |
| | Big Dunkard Sand (Mahoning) |
| Allegheny Series | Burning Springs Sand (Upper Freeport) |
| | Gas Sand of Marion and Monongalia Counties (Lower Freeport) |
| Pottsville Series | Second Cow Run Sand of Ohio (Homewood) |
| | Cairo Gas Sand |
| | Cairo Salt Sand |
| | Cairo? |
| | Rosedale Gas Sand (Guyandot?) |
| | Rosedale Salt Sand (Sharon Conglomerate) |
| **Mississippian:** | |
| Mauch Chunk Red Shale Series | Princeton Conglomerate |
| | Maxton, Dawson, Cairo |
| | Little Lime (Hinton) |
| Greenbrier Limestone | Big Lime |
| Pocono Sandstone Series | Keener Sand and Beckett Sand of Milton |
| | Big Injun Sand |
| | Squaw Sand |
| | Weir Sand |
| | Berea Sand |
| **Devonian:** | |
| Catskill Red Beds | Gantz Sand |
| | Fifty-foot Sand |
| | Thirty-foot Sand |
| | Gordon Stray Sand |
| | Gordon Sand |
| | Fourth Sand |
| | McDonald or Fifth Sand |
| | Bayard or Sixth Sand |
| | Elizabeth or Seventh Sand (Hendricks) |

| | |
|---|---|
| Chemung and Portage Beds........ | Warren First Sand<br>Warren Second (Burnside?) Sand<br>Clarendon or Tiona Sand<br>Speechley Sand<br>Balltown or Cherry Grove Sand<br>Sheffield or Cooper (Reiley?) Sand<br>Benson, Bradford? or Deer Lick Sand<br>Elk or Waugh and Porter Sand<br>Kane Sand |
| Hamilton and Marcellus........... | Gas in Ohio and Kentucky |
| Corniferous (Columbus) Limestone.. | Ragland, Menefee, or Irvine Sand of Kentucky |
| Oriskany Sandstone.............. | Oriskany Sand |
| **Silurian:** | |
| Helderberg, Salina, and Niagara.... | "Big Lime" of Ohio (Newberg Sand near middle) |
| Medina White Sandstone.......... | Clinton Sand of Ohio |
| **Ordovician:** | |
| Martinsburg or Cincinnati Shale.... | Hudson Sand Group of Kentucky |
| Trenton and Other Limestones..... | Trenton Sand Group of northern Ohio |

In Tucker County the known productive sands of the Monongahela Series do not exist at all as they belong above the tops of the mountains. Only fragments of the upper Conemaugh sands remain and those of the lower portion lie so near the surface and are exposed over such long outcrops that they may be eliminated as possible productive horizons. The sands of the Allegheny, Pottsville, Mauch Chunk, Greenbrier, and Pocono are buried at considerable depths in portions of the North Potomac and Stony River Synclines but they all outcrop for long distances in so many localities that they may be eliminated from further discussion. The same statement is largely true of the sands of the upper Devonian but their position in the eastern half of the county is much more favorable than that of the sands mentioned above. The sands of the lower Devonian, Silurian, and Ordovician are buried entirely throughout the county and therefore offer more hope of oil and gas than any of the others.

In the following table the approximate intervals from four principal key rocks; viz, **Upper Freeport (Davis) Coal, Sewell (Sharon?) Coal, Top of Big Lime,** and **Hendricks Sandstone,** are given for the county, the respective increase of intervals from the northwestern to the southeastern part being indicated by the two sets of figures in each column, there being no difference of consequence above the Rosedale Salt Sand. The sands named in the list above the Big Lime are important stratigraphic horizons although having no possibility of oil or gas. Regarding the accuracy of the table it may be stated that the intervals to the sands as far down as the Oriskany may be taken as approximately correct, as the deep well at Parsons reached that horizon and measurements of the rocks above it have been made in the county. Below the Oriskany the intervals are based on such general information as is available on these formations in the Appalachian region and they are therefore only an estimate:

**Table of Approximate Oil and Gas Sand Intervals, Tucker County.**

| Top of Sand. | Interval below base of Upper Freeport (Davis) Coal. | Interval below base of Sewell (Sharon?, Coal. | Interval below top of Big Lime (Greenbrier.) | Interval below top of Elizabeth (Hendricks) Sand. |
|---|---|---|---|---|
| Second Cow Run | 140 | ........... | ........... | ........... |
| Rosedale Gas | 550 | ........... | ........... | ........... |
| Sewell Coal | 575 | ........... | ........... | ........... |
| Rosedale Salt | 625 | 50 | ........... | ........... |
| Princeton Conglomerate | 700— 750 | 125— 175 | ........... | ........... |
| Maxton | 850— 1000 | 275— 425 | ........... | ........... |
| Little Lime | 1075— 1325 | 500— 750 | ........... | ........... |
| Big Lime | 1150— 1400 | 575— 825 | ........... | ........... |
| Keener | ........... | ........... | ........... | ........... |
| Big Injun | 1350— 1850 | 775— 1275 | 200— 450 | ........... |
| Squaw | 1400— 1900 | 825— 1325 | 250— 500 | ........... |
| Weir | 1450— 1950 | 875— 1375 | 300— 550 | ........... |
| Berea | 1500— 2000 | 925— 1425 | 350— 600 | ........... |
| Gantz | 1550— 2050 | 975— 1475 | 400— 650 | ........... |
| Fifty-foot | 1625— 2125 | 1050— 1550 | 475— 725 | ........... |
| Thirty-foot | 1700— 2225 | 1125— 1650 | 550— 825 | ........... |
| Gordon Stray | 1775— 2375 | 1200— 1800 | 625— 975 | ........... |
| Gordon | 1850— 2550 | 1275— 1975 | 700— 1150 | ........... |
| Fourth | 1950— 2750 | 1375— 2175 | 800— 1350 | ........... |
| McDonald (Fifth) | 2050— 2950 | 1475— 2375 | 900— 1550 | ........... |
| Bayard (Sixth) | 2150— 3200 | 1575— 2625 | 1000— 1800 | ........... |
| Elizabeth (Seventh, Hendricks) | 2250— 3450 | 1675— 2875 | 1100— 2050 | ........... |
| Warren First | 2600— 3800 | 2025— 3225 | 1450— 2400 | 350— 350 |
| Warren Second (Burnside?) | 3000— 4300 | 2425— 3725 | 1850— 2900 | 750— 850 |
| Clarendon or Tiona | 3400— 4600 | 2825— 4025 | 2250— 3200 | 1150— 1150 |
| Speechley | 3800— 5000 | 3225— 4425 | 2650— 3600 | 1550— 1550 |
| Balltown or Cherry Grove | 4200— 5400 | 3625— 4825 | 3050— 4000 | 1950— 1950 |
| Sheffield or Cooper (Reiley?) | 4600— 5800 | 4025— 5225 | 3450— 4400 | 2350— 2350 |
| Benson, Bradford? or Deer Lick. | 5000— 6200 | 4425— 5625 | 3850— 4800 | 2750— 2750 |
| Elk, or Waugh and Porter | 5300— 6500 | 4725— 5925 | 4150— 5100 | 3050— 3050 |
| Kane | 5700— 6900 | 5125— 6325 | 4550— 5500 | 3450— 3450 |
| Hamilton and Marcellus | 7800— 9000 | 7325— 8425 | 6650— 7600 | 5550— 5550 |
| Corniferous (Columbus) Limestone | 8500— 9700 | 7925— 9125 | 7350— 8300 | 6250— 6250 |
| Oriskany | 8650— 9850 | 8075— 9275 | 7500— 8450 | 6400— 6400 |
| Ohio "Big Lime" | 10000—11500 | 9325—10925 | 8850—10100 | 7750— 8050 |
| Clinton | 11000—12500 | 10425—11925 | 9850—11100 | 8750— 9050 |
| Martinsburg (Hudson) Group | 11600—13500 | 11025—12925 | 10450—12100 | 9350—10050 |
| Trenton Group | 12500—15000 | 11925—14425 | 11350—13600 | 10250—11550 |

By means of the above table, used in conjunction with Map II, it is possible to estimate the approximate depth from the surface to any sand where a drilling location might be selected.

In the western part of the county the elevation of the Hendricks Sandstone (Elizabeth Sand) is indicated by green contours on the map and affords a datum plane for that region. In the eastern portion the red contours on the Upper Freeport (Davis) Coal furnish a similar stratum of reference. Measurements could be made, also, at numerous points if desired, from the Sewell (Sharon?) Coal and from the top of the Big Lime (Greenbrier) to the surface level of a well, giving the necessary data from which the depth to any sand might be approximated.

## DESCRIPTION OF POSSIBLE PRODUCTIVE SANDS.

The sands above the Devonian Period are regarded as outcropping too widely over the county to offer any remote hope of oil or gas production, and as nearly all of them have been described in previous chapters under their geologic names they need little further discussion. That oil once existed in some of these beds, however, is proved by an examination of the Greenbrier Limestone (Big Lime) at a quarry in Randolph County about ten miles south of the Tucker Line where Dr. Price describes as follows the data obtained by himself and the writer:

"In the limestone quarry of the Nydegger Lime and Stone Company on the south bank of Shavers Fork of Cheat River in Randolph County between Faulkner and Bowden Stations and about 0.25 mile southeast of Faulkner Station, a thickness of about 60 feet of the lower thick limestone member of the series is exposed. In the lower part of the quarry the limestone is black for a thickness of about 30 feet. In the center of this black portion were found numerous small geodes set with white crystals of calcite. In some of these geodes the crystals were black and the center of the geode was filled with a soft black, waxy, inflammable petroleum residue. It is evident that this portion of the lower limestone bed is the 'Big Lime' of the oil well drillers. The former presence of oil in the Big Lime in the eastern part of the State is of interest in view of the oil and gas 'sand' in the Big Lime in the southwestern and western counties."

## SANDS OF THE CATSKILL RED BEDS.

The sands of the Catskill Red Beds, as previously mentioned in Chapter XI, are extremely shaly in the northwestern part of the county where they outcrop, the **Seventh or Elizabeth Sand (Hendricks Sandstone)** being the most persistent of the group. Although very thin at all points observed it is conglomeratic and porous, but being above drainage in that portion of the county could not contain oil or gas. In the southern end of the county, in the vicinity of Jenningston and Scotts Siding, the lower members of the Catskill thicken into heavy sandstone beds, and as the expansion of the series is known to continue southeastward it is probable that they are well developed in the Blackwater drainage area southeast of Davis where they lie buried at a considerable depth.

## SANDS OF THE CHEMUNG AND PORTAGE BEDS.

In the western portion of the county where the sands of the Chemung Series are exposed above drainage they consist for the most part of very thin and lenticular beds, seldom more than two or three feet in thickness. Farther southwest in Randolph County, where the Portage Series outcrops, it appears to be largely composed of shale. It is probable that in the southeastern corner of the county where these two groups lie deep under drainage some of these sands may be present in considerable quantity. The **Burnside (Warren Second?) Sand** has produced gas in Harrison County, the **Speechley** has produced it in many wells in the same county, and at McKeesport, Pennsylvania, a small area has yielded a large amount of gas within the last few years. The **Reiley (Sheffield or Cooper?) Sand** has produced commercial gas at one well in western Barbour County, and the **Benson (Bradford?) Sand** is producing gas in this county and Harrison and Lewis from several wells, and made a show of oil in Barbour County. In the deep well at Parsons three shows, or pockets, of gas were found at different levels in the Portage beds.

## SANDS OF THE LOWER DEVONIAN.

The Genesee, Hamilton, and Marcellus beds are largely composed of dark, bituminous shales, with very few sandstones of consequence. They are probably a mother source of oil and gas which migrated during or after their formation into the nearest available porous reservoirs. Lenticular sands in these groups have produced gas in Ohio and Kentucky but none has been found in the few West Virginia wells that have pierced them. The **Corniferous (Columbus) Limestone** is a prolific oil horizon in Kentucky where it bears the name of **Ragland, Menefee, or Irvine Sand.** In West Virginia a few wells have been drilled through it, oil having been found in what seems to represent its horizon, or possibly the Oriskany Sand, according to Dr. White, in Wood County, the production having been drowned out by salt water. In the deep well at Parsons, where the Corniferous Limestone is 20 feet thick, a pocket of gas was found in it. The **Oriskany Sand** is an ideal porous reservoir, 50 to 100 feet or more thick. At the Parsons well it had a thickness of 80 feet but contained salt water. East of the Tucker County Line it outcrops in the mountain region of Grant, Pendleton, and other counties and there can be little doubt that it is generally present throughout Tucker and it is probably the most hopeful gas horizon of the county, since it is deeply buried at all points by an impervious cover of shales.

## SANDS OF THE SILURIAN PERIOD.

The Helderberg, Salina, and Niagara Groups, composed largely of limestone, and being known in Ohio as the **"Big Lime"**, have not been generally productive, although the **Newberg Sand,** coming near the middle of this stage, has made a considerable amount of gas in northern Ohio. In West Virginia and Pennsylvania only a few wells have been drilled into them, no oil or gas having been found. The Medina White Sandstone is a prolific oil producer in Ohio where it is known as the **Clinton Sand.** No well in the main producing fields in West Virginia or Pennsylvania has reached it, although several costly efforts have been made to test it.

There can be little doubt that it underlies Tucker County, as it is two hundred and fifty feet or more in thickness in Pendleton, Grant, and other counties farther east, where it outcrops over wide areas. In northwestern Pendleton its interval, as observed at outcrop by the writer, is roughly estimated as 2,500 feet below the Oriskany Sandstone, which would place it more than 6,000 feet deep at Parsons and 10,000 to 11,000 feet on the summit of the great dome of the Canaan Valley.

### SANDS OF THE ORDOVICIAN PERIOD.

The Martinsburg or Cincinnati Shale, which underlies the Clinton Sand, has been productive to a slight extent in Kentucky, where it is known as the Hudson Sand Group, but has not been reached in any of the deep tests of West Virginia or Pennsylvania. The Trenton and other limestones, which lie below the Martinsburg and Utica Shales, comprise a group that has produced a large amount of gas in northern Ohio. Their great depth in Tucker County would apparently preclude any hope of reaching them with the drill.

## WELL RECORDS AND PROSPECTIVE AREAS.

### PROSPECTIVE AREAS, LICKING DISTRICT.

Licking District is situated in the northwestern corner of the county where the outcropping rocks along the streams belong principally to the Catskill and Chemung Series, there being Pennsylvanian and Mississippian deposits on Limestone Mountain along the axis of the deep Hannahsville Syncline. Throughout the district there has been much folding of the strata, the two principal anticlines being the Texas and Etam, followed farther east by the Hannahsville Syncline. As prospective oil and gas territory the district is favored by a carbon ratio varying from 66 to 68, as shown by Figure 5, which would indicate that if no other criterion were considered there would be little hope of oil but gas would be within the range of possibility. Unfavorable features are the fact that the principal producing sands of the State are above drainage and that the strata have been so highly folded that the hydrocarbons which may have once been held in the lower sands may have escaped through fissures. If it should be desired to test the sands of the lower Devonian and Silurian, however, the most favored location would be on Right Fork of Bull Run at the point where the Etam Anticline crosses the stream. A well at this point would start approximately 900 feet below the Hendricks Sandstone (Elizabeth or Seventh Sand) and should reach the Speechley Sand at about 700 feet, the Reiley at about 1,400, the Benson at about 1,900, and the Oriskany at about 6,600, while the Clinton would be about 9,000 feet and probably too deep for present methods of drilling.

### PROSPECTIVE AREAS, CLOVER DISTRICT.

In Clover District, which is situated just south of Licking District and next to Barbour County, geologic outcrops, stratigraphic uplifts, and carbon ratios are essentially similar to those described under Licking District, except that only a small amount of Pennsylvanian and Mississippian strata is left. Probably the most hopeful location for a test would be at the point where the St. George Anticline crosses Right Fork of Clover Run. Here a well would start about 1,800 feet below the Hendricks Sandstone and should reach the Reiley Sand at about 600 feet, the Benson at about 1,000, the Oriskany at about 4,600, and the Clinton at about 7,000 feet.

### PROSPECTIVE AREAS, ST. GEORGE DISTRICT.

St. George District lies east of Licking and is traversed for many miles by the Deer Park Anticline, which is by far the greatest uplift in the county. Except at the eastern edge along Backbone Mountain, where there are more recent strata, the principal outcropping rocks belong to the Chemung Series, erosion having nearly reached its base along the anticline. The most favored region for a test would be on the crest of this anticline somewhere between Lead Mine and the Holly Meadows southwest of the mouth of Horseshoe Run. Figure 5 shows that the carbon ratio in this region varies from 68 to 70, a limit within which gas has been found elsewhere in the State, but the highly folded and broken condition of the strata is unfavorable. If a test should be made, however, a location either at Lead Mine or at the mouth of Horseshoe Run, on the axis of the anticline, would start approximately 2,800 feet below the Hendricks Sandstone, or very nearly at the level of the Benson Sand, and should reach the Oriskany at about 3,600 and the Clinton at about 6,000 feet.

## PROSPECTIVE AREAS, BLACK FORK DISTRICT.

Black Fork District lies south of St. George, its outcropping rocks ranging from the Pennsylvanian down nearly to the base of the Chemung Series of the Devonian, which outcrops in the western portion. The Deer Park Anticline passes along its northwestern border, the Parsons Anticline and some other minor folds occur farther east, and at the extreme southeastern edge the North Potomac Syncline forms a deep basin. In carbon ratio the district varies from 66 to 73. A deep test was once drilled by the Parsons Pulp and Lumber Company on its property at the southwest edge of Parsons, its location, as shown by Map II, being just east of a minor anticline east of the main Parsons fold. This well, which was drilled to a depth of 4,250 feet, as shown by its record published in connection with the Parsons Section, page 117, penetrated the Oriskany Sand and stopped at 190 feet below that horizon. Three shows, or pockets, of gas were found in the Portage beds and another in the Corniferous Limestone, there being salt water (8 to 10 barrels daily) in the Oriskany, the well having been abandoned as non-productive.

Probably a more favored region for drilling would have been along the crest of the Parsons Anticline. A well at the Moss Bridge, where the anticline crosses Cheat River, two miles north of Parsons, would start about 3,000 feet below the Hendricks Sandstone, or near the base of the Chemung Series, and should reach the Oriskany Sand at about 3,400 feet and the Clinton at about 5,800 feet. A test in the eastern portion of the district would be poorly advised, as it would be necessary to drill through several thousand feet of strata that are exposed to the atmosphere along the western sides of Backbone and McGowan Mountains.

### PROSPECTIVE AREAS, FAIRFAX DISTRICT.

Fairfax District lies east of St. George, its surface rocks belonging almost entirely to the Pennsylvanian Period. The North Potomac Syncline traverses its length from northeast to southwest and any well drilled must penetrate several thousand feet of strata which are exposed to the air along the western side of Backbone Mountain. Depths to the sands of the lower Devonian and Silurian would be prohibitive and any test of the upper sands would likely prove barren.

### PROSPECTIVE AREAS, DAVIS DISTRICT.

Davis District lies east of Fairfax District and next to Grant County, its surface rocks ranging from the Conemaugh Series of the Pennsylvanian down to the Pocono Series of the Devonian, and its carbon ratio varying from 74 to 78. It is traversed from north to south by the Blackwater Anticline which makes an immense structural dome in the Canaan Valley with a closure of about 500 feet. From a structural standpoint alone this dome would be an ideal gas reservoir, but it is very doubtful if gas exists in a region of such high carbon. The most favored locality for a test would be on the Blackwater River at the mouth of Sand Run, about 2½ miles northeast of Cortland. At this point a well would start below the Big Injun Sand or about 500 feet below the top of the Big Lime and should reach the Burnside Sand at about 2,400 feet, the Speechley at about 3,100, the Reiley at about 3,900, the Benson at about 4,300, the Oriskany at about 8,000 and the Clinton at about 10,500. It is doubtful whether any hope of gas could be entertained in the sands above the Oriskany, owing to their extensive outcrops in the Cheat Valley, but if a well could be drilled to the Oriskany or Clinton it is possible that gas might be found.

### PROSPECTIVE AREAS, DRY FORK DISTRICT.

Dry Fork District lies south of Davis District and occupies the southeastern corner of the county, its outcropping rocks ranging from the Conemaugh Series of the Pennsylvanian down nearly to the base of the Catskill Series of the Devonian, and its carbon ratio varying from 70 to 78, or more. It is traversed by the Blackwater Anticline and the Stony River Syncline. At its northern border it embraces a large portion of the closed dome along the anticline, and a test just east of Blackwater River and just south of the Davis-Dry Fork District Line would be of the same value and encounter the same conditions as the one suggested for Davis District. Farther southwest along the same anticline, in the vicinity of Scotts Siding or Jenningston, on Dry Fork of Cheat River, a test could be started near the base of the Catskill Series and would probably reach the Oriskany at about 6,500 feet, and the Clinton at about 9,000 feet, but its structural location would not be so good, as the strata rise southwestward from this locality into Randolph County.

The following is the record of a well drilled in Pendleton County, approximately 15 miles south of Laneville, Tucker County:

### Mrs. Clara Harper No. 1 Well Record.

On the west side of North Fork of South Branch of Potomac River, three-fourths mile north of Riverton; authority, North Fork Oil and Gas Company; elevation, 1870′ B.

| | Top. Feet. | Bottom. Feet. |
|---|---|---|
| Conductor | 0 | 38½ |
| Black Lime | 130 | .... |
| Coal (probably black shale) | 170 | 178 |
| Black Lime, Corniferous (?) | 178 | 200 |
| Slate | 200 | 220 |
| Sand, gray, Oriskany (?) | 220 | 235 |
| Slate and shells, black | 235 | 250 |
| Lime, blue (10″ casing, 275′) | 250 | 325 |
| Slate and shells | 325 | 650 |
| Lime, blue | 650 | 790 |
| Sand, gray | 790 | 815 |
| Slate and shells, (8¼″ casing) | 815 | 1150 |
| Slate and shells | 1150 | 1190 |
| Sand, coarse | 1190 | 1200 |
| Slate and shells | 1200 | 1290 |
| Sand, coarse | 1290 | 1300 |
| Slate and shells | 1300 | 1507 |
| Sand, gray | 1507 | 1517 |
| Slate and shells | 1517 | 1800 |
| Sand, black | 1800 | 1850 |

At the above well drilling had been suspended at the time of the writer's visit (July 1, 1919) and it is not known whether it has ever been drilled deeper. It is located on strata which dip steeply westward at an angle of 75 degrees or more, the surface outcrop being the black Marcellus Shales of the Devonian, while the Oriskany Sandstone crops on the river bank about 400 feet east of the well, with a visible thickness of 10 feet, and the Clinton (White Medina) Sandstone shoots vertically upward from the ridge one-fourth mile farther east. Although drilled to a depth of 1,850 feet the well could not have reached a stratigraphic level of more than a few hundred feet below the surface outcrop. A more unfortunate location for an oil well could hardly have been selected, and its result sheds no light whatever on the possibility of oil or gas in the surrounding region.

# CHAPTER XIII.

## COMMERCIAL COAL.

### GENERAL STATEMENT.

In Chapters V to VII, inclusive, a systematic description of all the coal seams found in Tucker County has been given, together with their correlations. Many of the beds are too thin, lenticular or impure to be of commercial rank and all of these have been fully described in the Chapters named, measured sections at openings and prospects being detailed. In the present Chapter numerous actual measured sections will be published for those coals that are of minable thickness and purity and estimates of their probable tonnage, with etchings showing their areal extent, will be given. At the end of the Chapter there is a table of analyses showing the chemical composition of the coals officially sampled and tested by the Survey. Certain other analyses, secured from the companies operating in the county, are published in the text.

In the county there are 5 coals that appear to have minable thickness and 23 others too thin, impure, or irregular to be of more than local value, some of these latter being thin beds that are of scientific interest only. The minable seams, in descending order, are the Pittsburgh, of the Monongahela Series; the Little Pittsburgh and Bakerstown (Thomas), of the Conemaugh Series; the Upper Freeport (Davis), of the Allegheny Series; and the Sewell (Sharon?), of the New River Group of the Pottsville Series.

Figure 6 shows the different coal seams of Tucker, giving not only their relative thickness, but also the maximum intervals (base to base) between them. Figures 7 to 11, inclusive, published in the present Chapter, will show, approximately, where each of the commercial seams occurs in possible minable thickness.

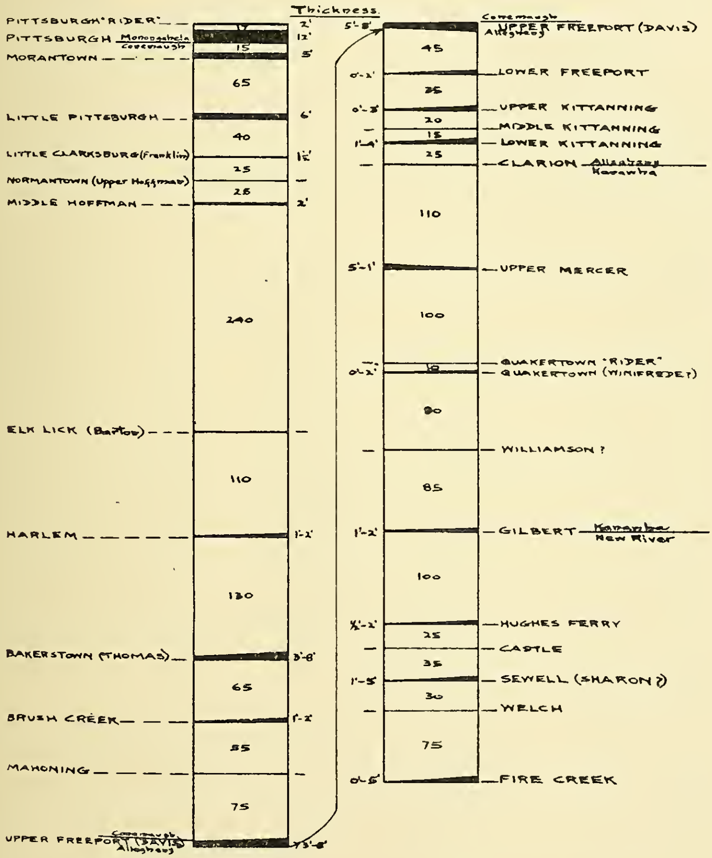


FIGURE 6.—DIAGRAM SHOWING RELATIVE POSITION OF COAL SEAMS.

R.C.T.

## STATISTICS OF COAL PRODUCTION.

Commercial coal mining has been followed for many years in Tucker County, there being a number of large and well-equipped plants delivering to the market a heavy annual tonnage. At present the industry is entirely confined to the North Potomac Basin in Fairfax and Davis Districts, only two seams, the Bakerstown (Thomas) and the Upper Freeport (Davis), being exploited. In former years a small amount was mined from the Pittsburgh and Little Pittsburgh beds in the vicinity of Fairfax, but these operations have been abandoned, the former seam having been largely exhausted. The Sewell (Sharon?) Coal has been mined to a limited extent for fuel along some of the logging railroads but all of these plants have been abandoned and no general attempt has been made to develop this bed on a commercial scale, as it is less easily accessible than the Bakerstown and Upper Freeport. Mining is carried on by drift, slope, and shaft. Coke was formerly produced on an extensive scale in the vicinity of Coketon and Douglas but many of the ovens, which are all of the bee-hive type, have been abandoned, the coal being largely shipped east and made into coke in by-product ovens. One company, however, still makes coke at its mining plant.

The following tables, assembled from statistics given in the Annual Reports of the West Virginia Department of Mines, and supplemented by unpublished data for 1921 from R. M. Lambie, present Chief, give the coal and coke production of the county for the past 34 years, its relative rank in production as compared to other counties, and the production of coal and coke by mines for the 25 years ending June 30, 1921:

## Production of Coal and Coke in Tucker County, 1888 to 1921, and Order of Production by Counties.

(Fiscal years end June 30th of each year).

| Year. | COAL. Order. | Long Tons. (2240 Lbs.) | Short Tons. (2000 Lbs.) | COKE. Short Tons. (2000 Lbs.) | Order. |
|---|---|---|---|---|---|
| 1888 | 13 | 48,256 | 54,046.72 | ............ | ...... |
| 1889 | 14 | 79,647 | 89,204.64 | ............ | ...... |
| 1890 | 7 | 219,087 | 245,377.44 | ............ | ...... |
| 1891 | 7 | 189,050 | 211,736.00 | ............ | ...... |
| 1892 | 7 | 369,320 | 413,638.40 | ............ | ...... |
| 1893 | 7 | 538,950 | 603,624.00 | ............ | ...... |
| 1894 | 7 | 418,805 | 469,061.60 | ............ | ...... |
| 1895 | 7 | 316,345 | 354,306.40 | ............ | ...... |
| 1896 | 7 | 523,624 | 586,458.88 | ............ | ...... |
| 1897 | 6 | 647,666 | 725,385.92 | 159,842 | 3 |
| 1898 | 6 | 831.497 | 931,276.64 | 229,261 | 3 |
| 1899 | 7 | 490,038 | 548,842.56 | 140,638 | 5 |
| 1900 | 5 | 1,098,874 | 1,230,738.88 | 295,731 | 4 |
| 1901 | 7 | 938,304 | 1,050,900.48 | 176,392 | 3 |
| 1902 | 7 | 1,011,435 | 1,132,807.20 | 279,680 | 3 |
| 1903 | 7 | 1,078,997 | 1,208,476.64 | 284,122 | 3 |
| 1904 | 8 | 1,037,758 | 1,162,288.96 | 221,801 | 3 |
| 1905 | 8 | 961,293 | 1,076,648.16 | 231,500 | 4 |
| 1906 | 8 | 1,057,800 | 1,184,736.00 | 253,492 | 4 |
| 1907 | 10 | 1,005,219 | 1,125,845.28 | 262,951 | 4 |
| 1908 | 10 | 920,568 | 1,031,036.16 | 149,229 | 4 |
| 1909 | 10 | 1,005,873 | 1,126,577.76 | 97,684 | 7 |
| 1910 | 10 | 1,080,367 | 1,210,011.04 | 173,840 | 6 |
| 1911 | 10 | 1,083,881 | 1,213,946.72 | 76,436 | 7 |
| 1912 | 10 | 1,114,732 | 1,248,499.84 | 40,710 | 8 |
| 1913 | 10 | 1,100,160 | 1,232,179.20 | 29,934 | 8 |
| 1914 | 11 | 1,199,113 | 1,343,006.56 | 14,361 | 11 |
| 1915 | 10 | 1,453,752 | 1,628,202.24 | 7,763 | 11 |
| 1916 | 10 | 1,313,348 | 1,470,949.76 | 13,097 | 12 |
| 1917 | 12 | 1,214,964 | 1,360,759.68 | 10,265 | 10 |
| 1918 | 13 | 1,297,211 | 1,452,876.32 | 11,113 | 11 |
| 1919 | 15 | 1,117,058 | 1,251,104.96 | 6,937 | 11 |
| 1920 | 19 | 938.270 | 1,050,862.40 | 8,444 | 9 |
| 1921 | 18 | 1,068,257 | 1,196,447.84 | 7,808 | ...... |
| Totals | ...... | 28,769,519 | 32,221,861.28 | 3,183,031 | ...... |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1921.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) | | | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) | | | | PRODUCTION OF COKE. (Tons of 2,000 lbs.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First Six Months. | Second Six Months. | Total Coal Produced During Year. | Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | First Six Months. | Second Six Months. | Total Coke Production for Year. |
| Blackwater Coal Co. | Cooper | 17,064 | 6,263 | 23,327 | ........ | 11,181 | ........ | 12,146 | ........ | ........ | ........ |
| Cumberland Coal Co. | Douglas No. 1 | 38,286 | 48,487 | 86,773 | 1,403 | 99 | 11.712 | 73,559 | 5,393 | 2,415 | 7,808 |
| Cumberland Coal Co. | Douglas No. 2 | 20,691 | 6,660 | 27,351 | ........ | ........ | ........ | 27,351 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 23 | 56,038 | 32,202 | 88,240 | 30,638 | 1,675 | ........ | 55,927 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 24 | 23,252 | 24,926 | 48,178 | ........ | ........ | ........ | 48,178 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 25 | 26,489 | 37,857 | 64,346 | ........ | ........ | ........ | 64,346 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 26 | 5,333 | ........ | 5,333 | ........ | ........ | ........ | 5,333 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 28 | 2,205 | ........ | 2,205 | ........ | ........ | ........ | 2,205 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 29 | 24,718 | 11,212 | 35,930 | ........ | 380 | ........ | 35,550 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 29½ | 15,112 | 5,729 | 20,841 | ........ | ........ | ........ | 20,841 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 34 | 48,018 | 61,307 | 109,325 | ........ | ........ | ........ | 109,325 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 36 | 4,885 | 9,394 | 14.279 | ........ | 506 | ........ | 13,773 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 37 | 87,599 | 80,334 | 167,933 | ........ | ........ | ........ | 167,933 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 38 | 51,188 | 27,260 | 78,448 | 968 | 644 | ........ | 76,836 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 39 | 59,988 | 53,633 | 113,621 | 1,237 | 746 | ........ | 111,638 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 40 | 62,766 | 54,956 | 117,722 | 1,305 | 108 | ........ | 116,309 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 43 | 47,152 | 17,253 | 64,405 | ........ | 377 | ........ | 64,028 | ........ | ........ | ........ |
| Totals | | 590,784 | 477,473 | 1,068,257 | 35,551 | 15,716 | 11,712 | 1,005,278 | 5,393 | 2,415 | 7,808 |

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1920.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackwater Coal Co..... | Cooper | 14,973 | 12,546 | 27,519 | | 6,498 | | 21,021 | | | |
| Cumberland Coal Co..... | Douglas No. 1 | 36,842 | 40,232 | 77,074 | 1,171 | 136 | 12,667 | 63,100 | 3,583 | 4,861 | 8,444 |
| Cumberland Coal Co..... | Douglas No. 2 | 16,207 | 16,054 | 32,261 | 138 | | | 32,123 | | | |
| Davis Coal and Coke Co.. | No. 23 | 71,042 | 56,151 | 127,193 | 34,188 | 1,490 | | 91,515 | | | |
| Davis Coal and Coke Co.. | No. 24 | | 5,987 | 5,987 | | | | 5,987 | | | |
| Davis Coal and Coke Co.. | No. 25 | 21,716 | 22,793 | 44,509 | | | | 44,509 | | | |
| Davis Coal and Coke Co.. | No. 26 | | 340 | 340 | | | | 340 | | | |
| Davis Coal and Coke Co.. | No. 29 | 5,268 | 17,330 | 22,598 | | 54 | | 22,544 | | | |
| Davis Coal and Coke Co.. | No. 29½ | | 923 | 923 | | | | 923 | | | |
| Davis Coal and Coke Co.. | No. 34 | 29,730 | 29,927 | 59,657 | | | | 59,657 | | | |
| Davis Coal and Coke Co.. | No. 36 | 8,645 | 6,740 | 15,385 | | 400 | | 14,985 | | | |
| Davis Coal and Coke Co.. | No. 37 | 83,600 | 72,956 | 156,556 | | | | 156,556 | | | |
| Davis Coal and Coke Co.. | No. 38 | 44,147 | 39,942 | 84,089 | 1,086 | 548 | | 82,455 | | | |
| Davis Coal and Coke Co.. | No. 39 | 47,488 | 54,197 | 101,685 | 1,396 | 869 | | 99,420 | | | |
| Davis Coal and Coke Co.. | No. 40 | 47,658 | 51,753 | 99,411 | 1,163 | 20 | | 98,228 | | | |
| Davis Coal and Coke Co.. | No. 43 | 40,912 | 42,171 | 83,083 | | 564 | | 82,519 | | | |
| Totals............ | | 468,228 | 470,042 | 938,270 | 39,142 | 10,579 | 12,667 | 875,882 | 3,583 | 4,861 | 8,444 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1919.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackwater Coal Co. | Cooper | 18,576 | 18,159 | 36,735 | | 8,037 | | 28,698 | | | |
| Cumberland Coal Co. | Douglas No. 1 | 36,007 | 43,317 | 79,324 | 1,365 | 85 | 10,406 | 67,468 | 4,361 | 2,576 | 6,937 |
| Cumberland Coal Co. | Douglas No. 2 | 20,141 | 20,392 | 40,533 | 76 | | | 40,457 | | | |
| Davis Coal and Coke Co. | No. 23 | 88,831 | 74,755 | 163,586 | 27,737 | 1,166 | | 134,683 | | | |
| Davis Coal and Coke Co. | No. 24 | 23,974 | 2,628 | 26,602 | | | | 26,602 | | | |
| Davis Coal and Coke Co. | No. 25 | 23,119 | 21,578 | 44,697 | | | | 44,697 | | | |
| Davis Coal and Coke Co. | No. 26 | 22,504 | 2,603 | 25,107 | | | | 25,107 | | | |
| Davis Coal and Coke Co. | No. 28 | 7,040 | | 7,040 | | | | 7,040 | | | |
| Davis Coal and Coke Co. | No. 29 | 33,011 | 4,725 | 37,736 | | 151 | | 37,585 | | | |
| Davis Coal and Coke Co. | No. 29½ | 24,210 | 3,847 | 28,057 | | | | 28,057 | | | |
| Davis Coal and Coke Co. | No. 34 | 30,972 | 25,047 | 56,019 | | | | 56,019 | | | |
| Davis Coal and Coke Co. | Nos. 35 and 36 | 9,153 | 7,300 | 16,453 | | 181 | | 16,272 | | | |
| Davis Coal and Coke Co. | No. 37 | 91,107 | 76,364 | 167,471 | | | | 167,471 | | | |
| Davis Coal and Coke Co. | No. 38 | 53,808 | 45,571 | 99,379 | 1,201 | 305 | | 97,873 | | | |
| Davis Coal and Coke Co. | No. 39 | 53,753 | 55,076 | 108,829 | 1,540 | 640 | | 106,649 | | | |
| Davis Coal and Coke Co. | No. 40 | 44,378 | 48,220 | 92,598 | 1,113 | 175 | | 91,310 | | | |
| Davis Coal and Coke Co. | No. 43 | 39,920 | 45,680 | 85,600 | | 380 | | 85,220 | | | |
| Davis Coal and Coke Co. | No. 60 | 1,292 | | 1,292 | | 9 | | 1,283 | | | |
| Totals | | 621,796 | 495,262 | 1,117,058 | 32,032 | 11,129 | 10,406 | 1,062,491 | 4,361 | 2,576 | 6,937 |

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1918.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackwater Coal Co. | Cooper | 12,028 | 14,778 | 26,806 | | 18,334 | | 8,472 | | | |
| Cumberland Coal Co. | Douglas No. 1 | 40,874 | 40,037 | 80,911 | 1,486 | 19 | 16,669 | 62,737 | 5,795 | 5,318 | 11,113 |
| Cumberland Coal Co. | Douglas No. 2 | 24,758 | 23,052 | 47,810 | | | | 47,810 | | | |
| Davis Coal and Coke Co. | No. 23 | 79,540 | 72,196 | 151,736 | 27,005 | 1,731 | | 123,000 | | | |
| Davis Coal and Coke Co. | No. 24 | 26,181 | 25,804 | 51,985 | | | | 51,985 | | | |
| Davis Coal and Coke Co. | No. 25 | 29,593 | 25,325 | 54,918 | | | | 54,918 | | | |
| Davis Coal and Coke Co. | No. 26 | 28,952 | 24,268 | 53,220 | | | | 53,220 | | | |
| Davis Coal and Coke Co. | No. 28 | 15,921 | 12,741 | 28,662 | | | | 28,662 | | | |
| Davis Coal and Coke Co. | No. 29 | 36,847 | 34,649 | 71,496 | | 286 | | 71,210 | | | |
| Davis Coal and Coke Co. | No. 29½ | 20,966 | 21,912 | 42,878 | | | | 42,878 | | | |
| Davis Coal and Coke Co. | No. 34 | 38,577 | 34,187 | 72,764 | | | | 72,764 | | | |
| Davis Coal and Coke Co. | No. 36 | 6,334 | 6,776 | 13,110 | | | | 13,110 | | | |
| Davis Coal and Coke Co. | No. 37 | 86,633 | 78,914 | 165,547 | | 8 | | 165,539 | | | |
| Davis Coal and Coke Co. | No. 38 | 61,206 | 64,033 | 125,239 | 1,027 | 400 | | 123,812 | | | |
| Davis Coal and Coke Co. | No. 39 | 59,257 | 51,837 | 111,094 | 1,988 | 743 | | 108,363 | | | |
| Davis Coal and Coke Co. | No. 40 | 54,744 | 50,403 | 105,147 | 1,200 | 171 | | 103,776 | | | |
| Davis Coal and Coke Co. | No. 43 | 43,198 | 45,387 | 88,585 | | 515 | | 88,070 | | | |
| Davis Coal and Coke Co. | No. 60 | 3,377 | 1,926 | 5,303 | | 30 | | 5,273 | | | |
| Totals | | 668,986 | 628,225 | 1,297,211 | 32,706 | 22,237 | 16,669 | 1,225,599 | 5,795 | 5,318 | 11,113 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1917.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackwater Coal Co..... | Cooper | ........ | 2,952 | 2,952 | ........ | 2,400 | ........ | 552 | ........ | ........ | ........ |
| Cooper, J. Calvin....... | Cooper | 4,919 | 3,379 | 8,298 | ........ | 8,298 | ........ | ........ | ........ | ........ | ........ |
| Cumberland Coal Co..... | No. 1 | 42,749 | 49,267 | 92,016 | 550 | 350 | 15,398 | 75,718 | 4,689 | 5,576 | 10,265 |
| Cumberland Coal Co..... | Douglas No. 2 | 24,937 | 23,185 | 48,122 | ........ | ........ | ........ | 48,122 | ........ | ........ | ........ |
| Cumberland Coal Co..... | Douglas No. 6 | 3,562 | ........ | 3,562 | 250 | 50 | ........ | 3,262 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 23 | 49,903 | 56,092 | 105,995 | 22,377 | 1,516 | ........ | 82,102 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 24 | 21,982 | 21,483 | 43,465 | ........ | ........ | ........ | 43,465 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 25 | 24,240 | 23,608 | 47,848 | ........ | 98 | ........ | 47,750 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 26 | 19,776 | 25,625 | 45,401 | ........ | ........ | ........ | 45,401 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 28 | 4,178 | 16,364 | 20,542 | ........ | ........ | ........ | 20,542 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 29 | 30,396 | 43,033 | 73,429 | ........ | 71 | ........ | 73,358 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 29½ | 4,920 | 12,181 | 17,101 | ........ | ........ | ........ | 17,101 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 34 | 42,288 | 42,640 | 84,928 | 315 | ........ | ........ | 84,613 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 36 | ........ | 1,767 | 1,767 | ........ | ........ | ........ | 1,767 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 37 | 83,215 | 82,941 | 166,156 | ........ | ........ | ........ | 166,156 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 33 | 64,810 | 57,639 | 122,449 | 921 | 366 | ........ | 121,162 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 39 | 62,730 | 68,420 | 131,150 | 1,997 | 370 | ........ | 128,783 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 40 | 62,868 | 55,635 | 118,503 | 1,463 | 38 | ........ | 117,002 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | No. 43 | 39,471 | 41,809 | 81,280 | 55 | 288 | ........ | 80,937 | ........ | ........ | ........ |
| Totals............ | | 586,944 | 628,020 | 1,214,964 | 27,928 | 13,845 | 15,398 | 1,157,793 | 4,689 | 5,576 | 10,265 |

## Coal and Coke Tonnage Produced in Tucker County [illegible] the Various Mines for the Year Ending June 30, 1916.

| Name of Company. | Name of Mine. | Production of Coal. (Tons of 2,240 lbs.) First Six Months. | Production of Coal. Second Six Months. | Production of Coal. Total Coal Produced During Year. | Distribution of Coal. (Tons of 2,240 lbs.) Used in Operation of Mine. | Distribution of Coal. Furnished Local Trade and Tenants. | Distribution of Coal. Used in Coke Ovens. | Distribution of Coal. Quantity Shipped from Mine. | Production of Coke. (Tons of 2,000 lbs.) First Six Months. | Production of Coke. Second Six Months. | Production of Coke. Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cooper, J. Calvin | Cooper | 4,800 | 5,723 | 10,523 | | 10,523 | | | | | |
| Cumberland Coal Co. | Douglas No. 1 | 56,213 | 52,977 | 109,190 | | | 19,647 | 89,543 | 6,064 | 7,033 | 13,097 |
| Cumberland Coal Co. | Douglas No. 2 | 28,582 | 26,568 | 55,150 | | | | 55,150 | | | |
| Cumberland Coal Co. | Douglas No. 6 | 3,149 | 7,044 | 10,193 | 633 | 567 | | 8,993 | | | |
| Davis Coal and Coke Co. | Benbush No. 26 | 22,654 | 17,697 | 40,351 | 45 | | | 40,306 | | | |
| Davis Coal and Coke Co. | Benbush No. 28 | 11.047 | 3,662 | 14,709 | | | | 14,709 | | | |
| Davis Coal and Coke Co. | Benbush No. 38 | 99,184 | 66,797 | 165,981 | 699 | 323 | | 164,959 | | | |
| Davis Coal and Coke Co. | Central Power Station | No Production Reported | | | | | | | | | |
| Davis Coal and Coke Co. | Coketon No. 24 | 24,478 | 25,452 | 49,930 | | | | 49,930 | | | |
| Davis Coal and Coke Co. | Coketon No. 36 | 57,830 | 16,068 | 73,898 | | | | 73,898 | | | |
| Davis Coal and Coke Co. | Coketon No. 37 | 69,418 | 67,974 | 137,392 | | | | 137,392 | | | |
| Davis Coal and Coke Co. | Francis No. 11 | 18,705 | 3,850 | 22,555 | | 31 | | 22,524 | | | |
| Davis Coal and Coke Co. | Pierce No. 39 | 91,546 | 67,307 | 158,853 | 2,009 | 619 | | 156,225 | | | |
| Davis Coal and Coke Co. | Pierce No. 40 | 92,722 | 63,084 | 155,806 | 1,427 | 316 | | 154,063 | | | |
| Davis Coal and Coke Co. | Pierce No. 43 | 25,985 | 33,425 | 59,410 | 4 | 331 | | 59,075 | | | |
| Davis Coal and Coke Co. | Thomas No. 23 | 83,546 | 37,819 | 121,365 | 19,243 | 1,697 | | 100,425 | | | |
| Davis Coal and Coke Co. | Thomas No. 25 | 19,459 | 22,881 | 42,340 | 1,713 | | | 40,627 | | | |
| Davis Coal and Coke Co. | Thomas No. 29 | | 11,772 | 11,772 | | | | 11,772 | | | |
| Davis Coal and Coke Co. | Thomas No. 34 | 38,198 | 35,732 | 73,930 | 22 | | | 73,908 | | | |
| Totals | | 747,516 | 565,832 | 1,313,348 | 25,795 | 14,407 | 19,647 | 1,253,499 | 6,064 | 7,033 | 13,097 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1915.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| J. Calvin | Cooper | 6,361 | 5,878 | 12,239 | ........ | 12,239 | ........ | ........ | ........ | ........ | ........ |
| Cumberland Coal Co. | Douglas No. 1 | 43,941 | 43,088 | 87,029 | ........ | ........ | 11,645 | 75,384 | 4,187 | 3,576 | 7,763 |
| Cumberland Coal Co. | Douglas No. 2 | 25,842 | 25,237 | 51,079 | ........ | ........ | ........ | 51,079 | ........ | ........ | ........ |
| Cumberland Coal Co. | Douglas No. 6 | 4,007 | 2,284 | 6,291 | 861 | 339 | ........ | 5,091 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 23 | 89,397 | 81,123 | 170,520 | 23,084 | 1,765 | ........ | 145,671 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 24 | 35,390 | 29,877 | 65,267 | ........ | ........ | ........ | 65,267 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 25 | 42,093 | 20,644 | 62,737 | 857 | ........ | ........ | 61,880 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 26 | 29,255 | 25,991 | 55,246 | ........ | ........ | ........ | 55,246 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 34 | 5,341 | 29,458 | 34,799 | 50 | ........ | ........ | 34,749 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 35 | 15,286 | 11,743 | 27,029 | ........ | ........ | ........ | 27,029 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 36 | 75,715 | 72,731 | 148,446 | ........ | ........ | ........ | 148,446 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 37 | 48,680 | 63,226 | 111,906 | 45 | ........ | ........ | 111,861 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 38 | 108,961 | 94,214 | 203,175 | 943 | 212 | ........ | 202,020 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 39 | 78,034 | 91,072 | 169,106 | 2,450 | 625 | ........ | 166,031 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 41 | 23,390 | 18,087 | 41,477 | ........ | 70 | ........ | 41,407 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 40 | 88,700 | 94,147 | 182,847 | 1,089 | 330 | ........ | 181,428 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 43 | 5,682 | 18,877 | 24,559 | ........ | 186 | ........ | 24,373 | ........ | ........ | ........ |
| Totals | | 726,075 | 727,677 | 1,453,752 | 29,379 | 15,766 | 11,645 | 1,396,962 | 4,187 | 3,576 | 7,763 |

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1914.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cooper, J. Calvin, Lessee. | Cooper | 4,303 | 5,444 | 9,747 | ........ | 9,747 | ........ | ........ | ........ | ........ | ........ |
| Cumberland Coal Co. | Douglas No. 1 | 59,941 | 44,883 | 104,824 | ........ | ........ | 21,540 | 83,284 | 10,279 | 4,082 | 14,361 |
| Cumberland Coal Co. | Douglas No. 2 | 13,472 | 21,376 | 34,848 | ........ | ........ | ........ | 34,848 | ........ | ........ | ........ |
| Cumberland Coal Co. | Douglas No. 6 | 11,380 | 10,452 | 21,832 | 1,143 | ........ | ........ | 20,689 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 23 | 58,163 | 71,023 | 129,186 | 24,090 | 1,775 | ........ | 103,321 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 25 | 69,033 | 48,113 | 117,146 | ........ | ........ | ........ | 117,146 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 24 | 27 579 | 31,300 | 58,879 | 45 | ........ | ........ | 58,834 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 26 | 24,878 | 24,609 | 49,487 | 1,485 | ........ | ........ | 48,002 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 35 | ........ | 7,905 | 7,905 | ........ | ........ | ........ | 7,905 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 36 | 64,633 | 66,749 | 131,382 | ........ | ........ | ........ | 131,382 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 37 | 38,720 | 30,230 | 68,950 | ........ | ........ | ........ | 68,950 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Benbush No. 38 | 71,986 | 97,506 | 169,492 | 1,585 | 109 | ........ | 167,798 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas Shaft No. 34 | 11,136 | ........ | 11,136 | ........ | ........ | ........ | 11,136 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Francis No. 41 | 29,898 | 25,685 | 55,583 | 21 | 118 | ........ | 55,444 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Pierce No. 39 | 43,745 | 61,625 | 105,370 | 2,001 | 214 | ........ | 103,155 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Pierce No. 40 | 52,179 | 71,167 | 123,346 | 1,014 | 7 | ........ | 122,325 | ........ | ........ | ........ |
| Totals | | 581,046 | 618,067 | 1,199,113 | 31,384 | 11,970 | 21,540 | 1,134,219 | 10,279 | 4,082 | 14,361 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1913.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) | | | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) | | | | PRODUCTION OF COKE. (Tons of 2,000 lbs.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First Six Months. | Second Six Months. | Total Coal Produced During Year. | Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | First Six Months. | Second Six Months. | Total Coke Production for Year. |
| Cumberland Coal Co. | Douglas Nos. 1 and 5 | 88,791 | 86,742 | 175,533 | ........ | 1,200 | 37,621 | 136,712 | 7,821 | 17,259 | 25,080 |
| Cumberland Coal Co. | Douglas No. 2 | 4,264 | ........ | 4,264 | ........ | ........ | ........ | 4,264 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 23 | 63,234 | 53,383 | 116,617 | 21,650 | 1,708 | ........ | 93,259 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 24 | 21,284 | 24,049 | 45,333 | 47 | 95 | ........ | 45,191 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 25 | 40,452 | 65,268 | 105,720 | 3,092 | ........ | ........ | 102,628 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 26 | 18,926 | 26,214 | 45,140 | 668 | 44 | ........ | 44,428 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 34 Shaft | 33,735 | 22,341 | 56,076 | ........ | ........ | ........ | 56,076 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 36 | 73,789 | 63,692 | 137,481 | 21 | ........ | 7,282 | 130,178 | 4,854 | ........ | 4,854 |
| Davis Coal and Coke Co. | Coketon No. 37 | 45,245 | 44,578 | 89,823 | ........ | ........ | ........ | 89,823 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Benbush No. 38 | 64,076 | 72,808 | 136,884 | 1,639 | 245 | ........ | 135,000 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Pierce No. 39 | 22,083 | 40,395 | 62,478 | 2,232 | 18 | ........ | 60,228 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Pierce No. 40 | 37,048 | 44,608 | 81,656 | 1,167 | ........ | ........ | 80,489 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Francis No. 41 | 18,652 | 24,503 | 43,155 | ........ | 119 | ........ | 43,036 | ........ | ........ | ........ |
| Totals | ........ | 531,579 | 568,581 | 1,100,160 | 30,516 | 3,429 | 44,903 | 1,021,312 | 12,675 | 17,259 | 29,934 |

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1912.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co. | Douglas No. 1 | 52,807 | 69,528 | 122,335 | 1,200 | ........ | 11,280 | 109,855 | 4,191 | 3,329 | 7,520 |
| Cumberland Coal Co. | Douglas No. 2 | 26,950 | 38,677 | 65,627 | 110 | ........ | ........ | 65,517 | ........ | ........ | ........ |
| Cumberland Coal Co. | Douglas No. 5 | 17,602 | ........ | 17,602 | ........ | ........ | ........ | 17,602 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 23 | 71,142 | 80,125 | 151,267 | 24,893 | 2,069 | ........ | 124,305 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 25 | 42,960 | 55,988 | 98,948 | 6,530 | ........ | ........ | 92,418 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 28 | ........ | 2,418 | 2,418 | ........ | 7 | ........ | 2.411 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Thomas No. 34 | 41,992 | 42,486 | 84,478 | 1,364 | ........ | ........ | 83,114 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Pierce No. 39 | 7,263 | 18,233 | 25,496 | 2,059 | 4 | ........ | 23,433 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 24 | 26,376 | 39,082 | 65,458 | ........ | ........ | ........ | 65,458 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 26 | 18,615 | 18,359 | 36,974 | 978 | ........ | ........ | 35,996 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Coketon No. 36 | 108,142 | 81,458 | 189,600 | 211 | ........ | 49,786 | 139,603 | 19,474 | 13,716 | 33,190 |
| Davis Coal and Coke Co. | Coketon No. 37 | 32,201 | 41,733 | 73,934 | 156 | ........ | ........ | 73,778 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Pierce No. 40 | 8,216 | 34,655 | 42,871 | 1,650 | 15 | ........ | 41,206 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Francis No. 41 | 16,272 | 15.349 | 31,621 | 46 | 83 | ........ | 31,492 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | Bush No. 38 | 46,382 | 59,721 | 106,103 | 3,376 | 70 | ........ | 102,657 | ........ | ........ | ........ |
| Totals | | 516,920 | 597,812 | 1,114,732 | 42,573 | 2,248 | 61,966 | 1,008,845 | 23,665 | 17,045 | 40,710 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1911.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co. | Douglas No. 1 | 58,577 | 69.207 | 127,784 | 1,202 | | 37,009 | 89,573 | 18,626 | 6,047 | 24,673 |
| Cumberland Coal Co. | Douglas No. 2 | 5,799 | 10,281 | 16,080 | | | | 16,080 | | | |
| Cumberland Coal Co. | Douglas No. 5 | 48,497 | 2,243 | 50,740 | | | | 50,740 | | | |
| Davis Coal and Coke Co. | Thomas No. 23 and Pendleton Run | 105,994 | 85,112 | 191,106 | 20,553 | 2,090 | 8,888 | 159,575 | 5,922 | | 5,922 |
| Davis Coal and Coke Co. | Coketon No. 24 | 32,443 | 36,972 | 69,415 | 41 | | | 69,374 | | | |
| Davis Coal and Coke Co. | Thomas No. 25 | 70,354 | 56,592 | 126,946 | 8,350 | | | 118,596 | | | |
| Davis Coal and Coke Co. | Coketon No. 26 | 43,694 | 35,819 | 79,513 | 1,605 | 780 | | 77,128 | | | |
| Davis Coal and Coke Co. | Coketon No. 27 | 6,922 | 4,340 | 11,262 | | 843 | | 10,419 | | | |
| Davis Coal and Coke Co. | Thomas No. 28 | 2,983 | 2,453 | 5,436 | 304 | | | 5,132 | | | |
| Davis Coal and Coke Co. | Thomas No. 34 | 41,312 | 37,300 | 78,612 | | 268 | 2,258 | 76,086 | 1,508 | | 1,508 |
| Davis Coal and Coke Co. | Coketon No. 36 | 104,335 | 108,822 | 213,157 | 582 | | 24,726 | 187,849 | 13,132 | 3,337 | 16,469 |
| Davis Coal and Coke Co. | Coketon No. 37 | 40,659 | 37,778 | 78,437 | | | 41,895 | 36,542 | 13,452 | 14,412 | 27,864 |
| Davis Coal and Coke Co. | Bush No. 38 | | 14,642 | 14,642 | 797 | | | 13,845 | | | |
| Davis Coal and Coke Co. | Francis No. 41 | | 7,552 | 7,552 | 45 | | | 7,507 | | | |
| Gatzmer Coal and Coke Co | Gatzmer No. 1 | 7,993 | 5,206 | 13,199 | 108 | 1,488 | | 11,603 | | | |
| Totals | | 569,562 | 514,319 | 1,083,881 | 33,587 | 5,469 | 114,776 | 930,049 | 52,640 | 23,796 | 76,436 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1910.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co...... | Douglas No. 1.................. | 27,657 | 32,554 | 60,211 | 196 | 5,713 | ........ | 54,302 | ........ | ........ | ........ |
| Cumberland Coal Co...... | Douglas No. 5.................. | 34,710 | 73,108 | 107,818 | 1,799 | 321 | 43,613 | 62,085 | 4,014 | 28,551 | 32,565 |
| Davis Coal and Coke Co... | Thomas No. 23 and Pendleton Run | 116,341 | 108,900 | 225,241 | 18,838 | 2,244 | 50,673 | 153,486 | 14,323 | 19,462 | 33,785 |
| Davis Coal and Coke Co... | Coketon No. 24.............. | 3,049 | 23,262 | 26,311 | ........ | ........ | ........ | 26,311 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Thomas No. 25.............. | 76,307 | 70,532 | 146,839 | 6,740 | ........ | ........ | 140,099 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Coketon No. 26.............. | 33,781 | 43,146 | 76,927 | 19 | 1,359 | ........ | 75,549 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Coketon No. 27.............. | ........ | 487 | 487 | 400 | ........ | ........ | 87 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Thomas No. 34.............. | 57,374 | 44,006 | 101,380 | ........ | ........ | 22,385 | 78,995 | 10,920 | 4,002 | 14,922 |
| Davis Coal and Coke Co... | Coketon No. 35.............. | 21,240 | 3,182 | 24,422 | 4,102 | ........ | ........ | 20,320 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Coketon No. 36.............. | 83,787 | 108,188 | 191,975 | 290 | ........ | 54,607 | 137,078 | 14,113 | 22,287 | 36,400 |
| Davis Coal and Coke Co... | Coketon No. 37.............. | 60,386 | 49,480 | 109,866 | ........ | ........ | 84,245 | 25,621 | 28,874 | 27,294 | 56,168 |
| Gatzmer Coal and Coke Co.. | Gatzmer No. 1................ | 2,066 | 6,824 | 8,890 | 265 | 1,227 | ........ | 7,398 | ........ | ........ | ........ |
| Totals............. | ........................ | 516,698 | 563,669 | 1,080,367 | 32,649 | 10,864 | 255,523 | 781,331 | 72,244 | 101,596 | 173,840 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1909.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co...... | Douglas No. 1................ | 23,608 | 20,878 | 44,486 | 210 | ........ | ........ | 44,276 | ........ | ........ | ........ |
| Cumberland Coal Co...... | Douglas Nos. 4 and 5......... | 47,217 | 41,757 | 88,974 | 1,000 | 216 | 9,033 | 78,725 | 3,037 | 2,985 | 6,022 |
| Davis Coal and Coke Co... | Thomas No. 23 and Pendleton Run | 114,873 | 119,440 | 234,313 | 14,094 | 2,768 | 29,020 | 188,431 | 4,071 | 15,165 | 19,236 |
| Davis Coal and Coke Co... | Thomas No. 25............... | 79,203 | 67,638 | 146,841 | 5,122 | ........ | ........ | 141,719 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Coketon No. 26............. | 32,480 | 31,935 | 64,415 | ....... | 1,797 | ........ | 62,618 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Thomas No. 34.............. | 40,013 | 56,122 | 96,135 | ....... | ........ | 16,837 | 79,298 | 1,463 | 9,716 | 11,179 |
| Davis Coal and Coke Co... | Coketon No. 35............. | 29,166 | 23,783 | 52,949 | 7,228 | ........ | 25,616 | 20,105 | 17,927 | ........ | 17,927 |
| Davis Coal and Coke Co... | [illegible].............. | 78,421 | 74,783 | 153,207 | ..... | ........ | 19,494 | 133,713 | 7,889 | 3,106 | 10,995 |
| Davis Coal and Coke Co... | Coketon No. 37............. | 57,513 | 61,124 | 118,637 | ....... | ........ | 75,740 | 42,897 | 24,291 | 27,299 | 51,581 |
| Beacon Coal and Coke Co.. | Beacon ...................... | 3,208 | ........ | 3,208 | 12 | 89 | ........ | 3,107 | ........ | ........ | ........ |
| Gatzmer Coal and Coke Co. | Gatzmer No. 1............... | 1,805 | 903 | 2,708 | 83 | 1,160 | ........ | 1 465 | ........ | ........ | ........ |
| Totals............. | ........................... | 507,510 | 498,363 | 1,005,873 | 27,749 | 6,030 | 175,740 | 796,354 | 58,678 | 58,262 | 116,940 |

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1908.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co...... | No. 1...................... | 2,912 | 2,446 | 5,358 | 25 | ........ | ........ | 5,333 | ........ | ........ | ........ |
| Cumberland Coal Co...... | Nos. 3, 4 and 5.............. | 68,951 | 44,787 | 113,738 | 1,022 | 855 | 34,238 | 77,623 | 17,984 | 4,508 | 22,492 |
| Davis Coal and Coke Co... | Thomas No. 23 and Pendleton Run | 142,714 | 88,210 | 230,924 | 13,402 | 3,261 | 27,321 | 186,940 | 15,200 | 3,365 | 18,565 |
| Davis Coal and Coke Co... | Thomas No 25.............. | 90,826 | 47 894 | 138,720 | 4,965 | ........ | ........ | 133,755 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Coketon No. 26.............. | 29,215 | 18,695 | 47,910 | ....... | 1,666 | ........ | 46,244 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | Thomas No. 34.............. | 64,773 | 37,643 | 102,416 | ....... | ........ | 16,952 | 85,464 | 10,999 | 546 | 11,545 |
| Davis Coal and Coke Co... | Coketon No. 35.............. | 22,119 | 15,575 | 37,694 | 6,130 | ........ | 31,564 | ........ | 12,550 | 8,494 | 21,044 |
| Davis Coal and Coke Co... | Coketon No. 36.............. | 59 344 | 44,934 | 104,278 | ....... | ........ | 54,090 | 50,188 | 26,738 | 9,328 | 36,066 |
| Davis Coal and Coke Co... | Coketon No. 37.............. | 51,964 | 33,152 | 85,116 | | ........ | 59,341 | 25,775 | 29,330 | 10,187 | 39,517 |
| Beacon Coal and Coke Co.. | Beacon .................... | 32,126 | 21,173 | 53,299 | 277 | 827 | ........ | 52,195 | ........ | ........ | ........ |
| Gatzmer Coal and Coke Co. | Gatzmer No. 1.............. | 416 | 669 | 1,115 | ....... | ........ | ........ | 1,115 | ........ | ........ | ........ |
| Totals............ | .......................... | 565,390 | 355,178 | 920,568 | 25,821 | 6,609 | 223,506 | 664,632 | 112,801 | 36,428 | 149,229 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1907.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Davis Coal and Coke Co... | No. 23 | 113,743 | 134,096 | 247,839 | 11,778 | 3,135 | *47,076 | 185,850 | 14,771 | 16,613 | 31,384 |
| Davis Coal and Coke Co... | No. 25 | 70,092 | 62,408 | 132,500 | 5,204 | ........ | ........ | 127,296 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | No. 26 | 21,728 | 20,093 | 41,821 | ....... | 1.433 | ........ | 40,388 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | No. 34 | 58,181 | 65,216 | 123,397 | ....... | ........ | 33,406 | 89,991 | 10,449 | 11,821 | 22,270 |
| Davis Coal and Coke Co... | No. 35 | 27,160 | 22.384 | 49,544 | 5,617 | ........ | 41,618 | 2,309 | 15,147 | 12,598 | 27,745 |
| Davis Coal and Coke Co... | No. 36 | 52,141 | 59,253 | 111,394 | ....... | ........ | 81,181 | 30.215 | 22,786 | 31,334 | 54,120 |
| Davis Coal and Coke Co... | No. 37 | 64,262 | 52,711 | 116,973 | ....... | ........ | 114,954 | 2,009 | 41,713 | 34,930 | 76,643 |
| Cumberland Coal Co...... | Nos. 3 and 4 | 47,301 | 47.156 | 94,457 | 430 | 270 | 76,184 | 17,573 | 26,614 | 24,175 | 50,789 |
| Cumberland Coal Co...... | No. 5 | 23,651 | 23.578 | 47.229 | 270 | 135 | ........ | 46,824 | ........ | ........ | ........ |
| Beacon Coal and Coke Co. | Beacon | 14,794 | 25,271 | 40,065 | 355 | 1,427 | ........ | 38,283 | ........ | ........ | ........ |
| Totals............ | | 193,053 | 512,166 | 1,005,219 | 23,654 | 6,400 | 394,429 | 580,736 | 131,480 | 131,471 | 262,951 |

*Used in ovens at No. 34 Mine.

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1906.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) | | | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) | | | | PRODUCTION OF COKE. (Tons of 2,000 lbs.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First Six Months. | Second Six Months. | Total Coal Produced During Year. | Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | First Six Months. | Second Six Months. | Total Coke Production for Year. |
| Davis Coal and Coke Co... | No. 23 | 122,274 | 133,902 | 256,176 | 10,931 | 4,335 | *45,237 | 195,673 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | No. 25 | 63,109 | 76,799 | 139,908 | 4,899 | ........ | ........ | 135,009 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | No. 26 | 1,906 | 13,491 | 15,397 | ........ | 1,128 | ........ | 14,269 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | No. 34 | 57,270 | 70,121 | 127,391 | ........ | ........ | 13,403 | 113,988 | 12,897 | 26,196 | 39,093 |
| Davis Coal and Coke Co... | No. 35 | 15,046 | 20,729 | 35,775 | 4,795 | ........ | 11,577 | 19,403 | 2,096 | 10,550 | 12,646 |
| Davis Coal and Coke Co... | No. 36 | 68,910 | 74,840 | 143,750 | ........ | ........ | **97,357 | 46,393 | 26,845 | 33,131 | 59,976 |
| Davis Coal and Coke Co... | No. 37 | 77,051 | 83,945 | 160,996 | ........ | 717 | 139,629 | 20,650 | 40,811 | 52,274 | 93,085 |
| Cumberland Coal Co...... | and 4 | 53,517 | 60,423 | 113,940 | 250 | 855 | 73,638 | 39,757 | 24,760 | 23,932 | 48,692 |
| Cumberland Coal Co...... | No. 5 | 15,488 | 19,570 | 35,058 | 160 | ........ | ........ | 34,898 | ........ | ........ | ........ |
| Beacon Coal and Coke Co. | Beacon No. 1 | 13,957 | 15,452 | 29,409 | 1,528 | 1,693 | ........ | 26,188 | ........ | ........ | ........ |
| Totals.............. | | 488,528 | 569,272 | 1,057,800 | 22,563 | 8,728 | 380,241 | 646,268 | 107,409 | 146,083 | 253,492 |

*Used in No. 34 ovens.
**Of this amount 7,391 tons were used in No. 35 ovens.

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1905.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Davis Coal and Coke Co.... | No. 23 | 122,483 | 122,892 | 245,375 | 10,989 | 3,316 | 37,847 | 193,223 | 12,193 | 13,038 | 25,231 |
| Davis Coal and Coke Co.... | No. 34 | 61,436 | 56,595 | 118,031 | ....... | ........ | 16,848 | 101,183 | 5,744 | 5,488 | 11,232 |
| Davis Coal and Coke Co.... | No. 25 | 56,017 | 53,239 | 109,256 | 3,792 | ........ | ........ | 105,464 | ........ | ........ | ........ |
| Davis Coal and Coke Co.... | No. 35 | 20,049 | 13,486 | 33,535 | 4,931 | ........ | 6,530 | 22,074 | 4,259 | 94 | 4,353 |
| Davis Coal and Coke Co.... | No. 36 | 57,554 | 68,267 | 125,821 | 298 | ........ | 91,375 | 34,148 | 28,738 | 32,846 | 61,584 |
| Davis Coal and Coke Co.... | No. 37 | 91,052 | 74,881 | 165,933 | ....... | 1,850 | 134,053 | 30,030 | 47,303 | 42,066 | 89,369 |
| Cumberland Coal Co...... | Douglas Nos. 3 and 4 | 42,833 | 42,928 | 85,761 | 536 | 397 | 53,210 | 31,618 | 16,831 | 22,900 | 39,731 |
| Cumberland Coal Co...... | Douglas No. 5 | 21,313 | 21,363 | 42,676 | 266 | ........ | ........ | 42,410 | ........ | ........ | ........ |
| Beacon Coal and Coke Co. | Beacon No. 1 | 16,193 | 18,712 | 34,905 | 982 | 2,240 | ........ | 31,683 | ........ | ........ | ........ |
| Totals............ | ........................ | 488,930 | 472,363 | 961,293 | 21,794 | 7,803 | 339,863 | 591,833 | 115,068 | 116,432 | 231,500 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1904.

| Name of Company. | Name of Mine. | Production of Coal (Tons of 2,240 lbs.): First Six Months. | Second Six Months. | Total Coal Produced During Year. | Distribution of Coal (Tons of 2,240 lbs.): Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | Production of Coke (Tons of 2,000 lbs.): First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Davis Coal and Coke Co... | No. 23 | 159,103 | 140,354 | 299,457 | 10,452 | 39,215 | 47,969 | 201,821 | 17,270 | 14,712 | 31,982 |
| Davis Coal and Coke Co... | Shaft No. 34 | 67,627 | 60,986 | 128,613 | ........ | ........ | 17,134 | 111,479 | 3,508 | 7,915 | 11,423 |
| Davis Coal and Coke Co... | No. 25 | 58,581 | 45,759 | 104,340 | 2,025 | ........ | ........ | 102,315 | ........ | ........ | ........ |
| Davis Coal and Coke Co... | No. 35 | 28,665 | 20,451 | 49,116 | 3,776 | ........ | 20,582 | 24,758 | 8,156 | 5,565 | 13,721 |
| Davis Coal and Coke Co... | No. 36 | 59,155 | 56,708 | 115,863 | 741 | ........ | 70,375 | 44,747 | 22,245 | 24,672 | 46,917 |
| Davis Coal and Coke Co... | No. 37 | 76,243 | 85,528 | 161,771 | ........ | 1,446 | 113,825 | 46,502 | 36,632 | 39,250 | 75,882 |
| Cumberland Coal Co...... | Douglas No. 1 | 28,209 | 25,649 | 53,858 | 500 | ........ | ........ | 53,358 | ........ | ........ | ........ |
| Cumberland Coal Co...... | Douglas No. 3 | 36,298 | 37,758 | 74,056 | 500 | 1,000 | 62,815 | 9,741 | 21,723 | 20,153 | 41,876 |
| Cumberland Coal Co...... | Douglas No. 4 | 15,210 | 18,450 | 33,660 | ........ | ........ | ........ | 33,660 | ........ | ........ | ........ |
| Beacon Coal and Coke Co. | Beacon | ........ | 17,024 | 17,024 | ........ | ........ | ........ | 17,024 | ........ | ........ | ........ |
| Totals............ | ........ | 529,091 | 508,667 | 1,037,758 | 17,994 | 41,661 | 332,698 | 645,405 | 109,534 | 112,267 | 221,801 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1903.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Davis Coal and Coke Co. | No. 23 | 154,763 | 166,771 | 321,534 | 11,473 | 3,084 | 73,819 | 233,158 | 25,324 | 23,887 | 49,211 |
| Davis Coal and Coke Co. | No. 34 Shaft | 72,431 | 78,305 | 150,736 | ........ | ........ | 7,596 | 143,140 | 1,810 | 3,254 | 5,064 |
| Davis Coal and Coke Co. | No. 25 | 38,675 | 49,637 | 88,312 | ........ | ........ | ........ | 88,312 | ........ | ........ | ........ |
| Davis Coal and Coke Co. | No. 35 | 22,611 | 25,998 | 48,609 | 3,696 | ........ | 37,486 | 7,427 | 2,023 | 2,925 | 4,948 |
| Davis Coal and Coke Co. | No. 36 | 54,116 | 60,924 | 115,040 | 782 | ........ | 97,960 | 16,298 | 31,134 | 34,170 | 65,304 |
| Davis Coal and Coke Co. | No. 37 | 85,429 | 90,198 | 175,627 | ........ | 1,854 | 162,232 | 11,541 | 52,642 | 55,693 | 108,335 |
| Cumberland Coal Co. | Douglas Nos. 1 and 3 | 78,522 | 100,617 | 179,139 | 600 | 300 | 76,889 | 101,350 | 24,165 | 27,095 | 51,260 |
| Totals | | 506,547 | 572,450 | 1,078,997 | 16,551 | 5,238 | 455,982 | 601,226 | 137,098 | 147,024 | 284,122 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1902.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) | | | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) | | | | PRODUCTION OF COKE. (Tons of 2,000 lbs.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | First Six Months. | Second Six Months. | Total Coal Produced During Year. | Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | First Six Months. | Second Six Months. | Total Coke Production for Year. |
| Davis Coal and Coke Co.. | Thomas Drift.................. | 163,689 | 166,353 | 330,042 | 10,502 | 2,739 | 58,343 | 258,458 | 16,517 | 22,379 | 38,896 |
| Davis Coal and Coke Co.. | Thomas Shaft.................. | 75,805 | 78,680 | 154,485 | ........ | ........ | 23,650 | 130,835 | 9,515 | 6,251 | 15,766 |
| Davis Coal and Coke Co.. | Thomas No. 3.................. | 13,086 | 36,338 | 49,424 | ........ | ........ | ........ | 49,424 | ........ | ........ | ........ |
| Davis Coal and Coke Co.. | Coketon No. 1.................. | 25,437 | 24,756 | 50,193 | 2,975 | ........ | 40,995 | 6,223 | 12,564 | 14,766 | 27,330 |
| Davis Coal and Coke Co.. | Coketon No. 2.................. | 51,250 | 54,572 | 105,822 | 685 | 119 | 83,618 | 21,400 | 23,234 | 32,511 | 55,745 |
| Davis Coal and Coke Co.. | Coketon No. 3.................. | 88,674 | 83,548 | 172,222 | ........ | 1,653 | 158,216 | 12,353 | 53,359 | 52,119 | 105,478 |
| Cumberland Coal Co..... | Douglas Nos. 1 and 3.......... | 66,490 | 82,757 | 149,247 | 600 | 300 | 51,697 | 93,650 | 12,060 | 24,405 | 36,465 |
| Totals........... | ........................... | 484,431 | 527,004 | 1,011,435 | 14,762 | 4,811 | 419,519 | 572,343 | 127,249 | 152,431 | 279,680 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1901.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co. | Douglas | 73,980 | 68,140 | 142,120 | 600 | 1,200 | 38,230 | 102,090 | 18,507 | 8,627 | 27,134 |
| W. Va. & Pgh. Ry.—M. Dept. | Thomas Drift | 148,633 | 144,226 | 292,859 | .... | ........ | 24,750 | 268,109 | 10,328 | 18,845 | 29.173 |
| W. Va. & Pgh. Ry.—M. Dept. | Thomas Shaft | 67,762 | 78,167 | 145,929 | .... | ........ | 24,750 | 121,179 | | | |
| W. Va. & Pgh. Ry.—M. Dept. | Thomas No. 3 | 11,065 | 18,982 | 30,047 | .... | ........ | ........ | 30,047 | ........ | ........ | ........ |
| W. Va. & Pgh. Ry.—M. Dept. | Coketon No. 1 | 5,064 | 27,954 | 33,018 | .... | ........ | 14,000 | 19,018 | | | |
| W. Va. & Pgh. Ry.—M. Dept. | Coketon No. 2 | 61,531 | 53,544 | 115,075 | .... | ........ | 100,300 | 14,775 | 61,107 | 58,978 | 120,085 |
| W. Va. & Pgh. Ry.—M. Dept. | Coketon No. 3 | 81,291 | 97,965 | 179,256 | .... | ........ | 100,300 | 78,956 | | | |
| Totals | | 449,326 | 488,978 | 938,304 | 600 | 1,200 | 302,330 | 634,174 | 89,942 | 86,450 | 176,392 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1900.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co..... | Douglas .................... | 65,000 | 97,000 | 162,000 | 1,000 | ........ | 78,000 | 83,000 | 20,000 | 32,000 | 52,000 |
| Davis Coal and Coke Co.. | Thomas Drift................. | 181,250 | 218,273 | 399,523 | 7,855 | 2,727 | 15,987 | 372,954 | 4,827 | 5,832 | 10,659 |
| Davis Coal and Coke Co.. | Thomas Shaft................. | 68,564 | 69,212 | 137,776 | 8 | ........ | 31,520 | 106,248 | 8,970 | 12,043 | 21,013 |
| W. Va. C. & Pgh. Ry.... | Coketon No. 1................ | 17,185 | 25,485 | 42,670 | ........ | 132 | 29,759 | 12,779 | 12,817 | 12,546 | 25,363 |
| W. Va. C. & Pgh. Ry.... | Coketon No. 2................ | 71,977 | 84,548 | 156,525 | 1,373 | 382 | 108,284 | 46,486 | 32,840 | 35,171 | 68,011 |
| W. Va. C. & Pgh. Ry.... | Coketon No. 3................ | 100,072 | 100,308 | 200,380 | ........ | 1,561 | 180,031 | 18,788 | 58,842 | 59,843 | 118,685 |
| Totals............ | ........................ | 504,048 | 594,826 | 1,098,874 | 10,236 | 4,802 | 443,581 | 640,255 | 138,296 | 157,435 | 295,731 |

# Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1899.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumberland Coal Co. | Douglas | 35,714 | 64,116 | 99,830 | ........ | ........ | 56,251 | 43,579 | 18,000 | 26,650 | 44,650 |
| Davis Coal and Coke Co. | Thomas Shaft | 37,678 | 37,679 | 75,357 | ........ | ........ | 12,731 | 62,626 | 4,243 | 4,244 | 8,487 |
| Davis Coal and Coke Co. | Thomas Drift No. 1 | 81,625 | 81,625 | 163,250 | 3,233 | 1,178 | 8,445 | 150,394 | 2,815 | 2,815 | 5,630 |
| Davis Coal and Coke Co. | Coketon No. 1 | 5,000 | 5,439 | 10,439 | ........ | ........ | 305 | 10,134 | ........ | 203 | 203 |
| Davis Coal and Coke Co. | Coketon No. 2 | 30,000 | 32,764 | 62,764 | 332 | 352 | 54,450 | 7,630 | 18,150 | 18,150 | 36,300 |
| Davis Coal and Coke Co. | Coketon No. 3 | 34,000 | 44,398 | 78,398 | ........ | 788 | 68,053 | 9,557 | 22,684 | 22,684 | 45,368 |
| Totals | | 224,017 | 266,021 | 490,038 | 3,565 | 2,318 | 200,235 | 283,920 | 65,892 | 74,746 | 140,638 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1898.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (Cumberland Coal Co.) | Douglas No. 1 | 59,500 | 59,800 | 119,300 | 300 | 1,200 | 80,000 | 37,800 | 25,000 | 25,000 | 50,000 |
| (Cumberland Coal Co.) | Douglas No. 2 | 5,500 | 6,500 | 12,000 | 150 | 50 | ........ | 11,300 | ........ | ........ | ........ |
| (Davis Coal and Coke Co.) | Thomas Drift | 138,503 | 118,140 | 256,643 | 2,466 | 1,396 | 13,245 | 239,236 | 4,109 | 4,721 | 8,830 |
| (Davis Coal and Coke Co.) | Thomas Drift No. 2 | 10,460 | 4,485 | 14,945 | ...... | ........ | ........ | 14,945 | ........ | ........ | ........ |
| (Davis Coal and Coke Co.) | Thomas Shaft | 48,629 | 57,624 | 106,253 | ...... | ........ | ........ | 106,253 | ........ | ........ | ........ |
| (Davis Coal and Coke Co.) | Coketon No. 1 | ........ | 1,954 | 1,954 | ...... | ........ | ........ | 1,954 | ........ | ........ | ........ |
| (Davis Coal and Coke Co.) | Coketon No. 3 | 113,613 | 107,786 | 221,399 | ...... | 1,486 | 173,838 | 46,075 | 56,022 | 59,869 | 115,891 |
| (Davis Coal and Coke Co.) | Coketon No. 2 | 44,477 | 54,526 | 99,003 | 55 | 560 | 81,811 | 16,577 | 21,624 | 32,916 | 54,540 |
| Totals |  | 420,682 | 410,815 | 831,497 | 2,971 | 4,992 | 348,894 | 474,640 | 106,755 | 122,506 | 229,261 |

## Coal and Coke Tonnage Produced in Tucker County by the Various Mines for the Year Ending June 30, 1897.

| Name of Company. | Name of Mine. | PRODUCTION OF COAL. (Tons of 2,240 lbs.) First Six Months. | Second Six Months. | Total Coal Produced During Year. | DISTRIBUTION OF COAL. (Tons of 2,240 lbs.) Used in Operation of Mine. | Furnished Local Trade and Tenants. | Used in Coke Ovens. | Quantity Shipped from Mine. | PRODUCTION OF COKE. (Tons of 2,000 lbs.) First Six Months. | Second Six Months. | Total Coke Production for Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (Cumberland Coal Co.) | Douglas | 53,988 | 45,770 | 99,758 | ........ | ........ | ........ | ........ | 15,615 | 17,950 | 32,965 |
| (Davis Coal and Coke Co.) | Coketon No. 2 | 32,741 | 22,768 | 55,509 | ........ | ........ | ........ | ........ | 14,662 | 7,973 | 22,635 |
| (Davis Coal and Coke Co.) | Coketon No. 3 | 78,484 | 117,218 | 195,702 | ........ | ........ | ........ | ........ | 37,181 | 57,701 | 94,882 |
| (Davis Coal and Coke Co.) | Thomas Drift No. 1 | 92,177 | 103,706 | 195,883 | ........ | ........ | ........ | ........ | 5,014 | 4,346 | 9,360 |
| (Davis Coal and Coke Co.) | Thomas Drift No. 2 | 378 | 7,470 | 7,848 | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| (Davis Coal and Coke Co.) | Thomas Shaft | 42,637 | 50,329 | 92,966 | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Totals | | 300,405 | 347,261 | 647,666 | ........ | ........ | ........ | ........ | 71,872 | 87,970 | 159,842 |

## RECORDS OF COAL TEST BORINGS.

In Tucker County 70 tests for coal have been bored, all of them having been located on Map II and most of their surface levels having been secured. Besides these tests 14 others have been made in adjoining counties that have bearing on the coal resources of Tucker. Of these borings the records of nearly all were secured through the generous cooperation of the companies or financial interests which made them. The following table gives, in summarized form, the property, surface elevations, and condensed records of these tests, as far as these data could be secured. The first column gives the key number on Map II, by which the positions of the borings may be found, and in the elevation column the letter "L" signifies a spirit- or hand-level determination, and "B" indicates that the aneroid was used, checked on the nearest Government elevation. The following abbreviations of company names have been used:

Bridges Hrs..............Robert Bridges Heirs.
Davis C. & C.............Davis Coal & Coke Company.
Wayne Coal.............. Wayne Coal Company.

# Summarized Record of Tests for Coal in Tucker County.

| No. on Map II. | Name of Property. | Magisterial District. | Company. | Elevation above Tide | Bakerstown (Thomas) Coal. | | Brush Creek Coal. | | Upper Free-port (Davis) Coal. | | Upper Kit-tanning Coal. | | Lower Kit-tanning Coal. | | Total Depth. | No. on Map II. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | | |
| 1 | Davis Coal & Coke Co. No. 1.. | Fairfax........... | Davis C. & C.. | 3180B | ..... | ...... | ...... | ...... | 110.7 | 7.5 | ...... | ...... | ...... | ...... | 123 | 1 |
| 2 | Davis Coal & Coke Co. No. 3.. | Fairfax........... | Davis C. & C.. | 3149L | ..... | ...... | 57.8 | 1.7 | 162.2 | 8.6 | ...... | ...... | ...... | ...... | 175 | 2 |
| 3 | Davis Coal & Coke Co. No. 2.. | Fairfax........... | Davis C. & C.. | 3159L | ..... | ...... | ...... | ...... | 80.0 | 13.2 | ...... | ...... | ...... | ...... | 95 | 3 |
| 4 | Davis Coal & Coke Co. No. 4.. | Fairfax........... | Davis C. & C.. | 3100L | ..... | ...... | 36.4 | 1.3 | 137.2 | 13.0 | ...... | ...... | ...... | ...... | 151 | 4 |
| 5 | Davis Coal & Coke Co. No. 7.. | Fairfax........... | Davis C. & C.. | 2994L | ..... | ...... | ...... | 0 | 200.8 | 10.8 | ...... | ...... | ...... | ...... | 213 | 5 |
| 6 | Davis Coal & Coke Co. No. 8.. | Fairfax........... | Davis C. & C.. | 3083L | 152.6 | 5.7 | ...... | 0 | 347.9 | 11.0 | ...... | ...... | ...... | ...... | 365 | 6 |
| 7 | Davis Coal & Coke Co. No. 5.. | Fairfax........... | Davis C. & C.. | 2992I | ..... | ...... | 4 | 1.5 | 114 | 11 | ...... | ...... | ...... | ...... | 126 | 7 |
| 8 | Davis Coal & Coke Co. No. 6.. | Fairfax........... | Davis C. & C.. | 3032L | ..... | 0 | 113.8 | 1 | 221.5 | 12.5 | ...... | ...... | ...... | ...... | 235 | 8 |
| 9 | Davis Coal & Coke Co. No. 10. | Fairfax........... | Davis C. & C.. | 2990B | 57.5 | 5 | ...... | 0 | 235 | 10.8 | ...... | ...... | ...... | ...... | 247 | 9 |
| 10 | Davis Coal & Coke Co. No. 9.. | Fairfax........... | Davis C. & C.. | 3105L | 247.8 | 4.3 | ...... | 0 | 428.7 | 7.2 | ...... | ...... | ...... | ...... | 443 | 10 |
| 11 | Davis Coal & Coke Co. No. 20. | Fairfax........... | Davis C. & C.. | 3069L | ..... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 11 |
| 12 | Davis Coal & Coke Co. No. 34. | Fairfax........... | Davis C. & C.. | 3124L | 190.4 | 4.2 | 259.8 | 1.3 | 302.2 | 3.2 | ...... | ...... | ...... | ...... | 463 | 12 |
| 13 | Davis Coal & Coke Co. No. 35. | Fairfax........... | Davis C. & C.. | 3108L | 73.2 | 5.8 | 140.6 | 1.2 | 286.5 | 0 | ...... | ...... | ...... | ...... | 296 | 13 |
| 14 | Davis Coal & Coke Co. No. 12. | Fairfax........... | Davis C. & C.. | 2995B | 180.5 | 5.5 | 255 | 1 | 366 | 6 | ...... | ...... | ...... | ...... | 381 | 14 |
| 15 | Davis Coal & Coke Co. No. 11. | Fairfax........... | Davis C. & C.. | 3100L | 244 | 8.3 | 342 | 0 | 431.1 | 14.2 | ...... | ...... | ...... | ...... | 447 | 15 |
| 16 | Davis Coal & Coke Co. No. 31. | Fairfax........... | Davis C. & C.. | 3080L | ..... | 0 | 374.1 | 1.2 | 498.7 | 2.2 | 570 | 0.5 | ...... | ...... | 579 | 16 |
| 17 | Davis Coal & Coke Co. No. 30. | Fairfax........... | Davis C. & C.. | ..... | ..... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 17 |
| 18 | Davis Coal & Coke Co. No. 29. | Fairfax........... | Davis C. & C.. | 3094L | 260.5 | 3.4 | 347.5 | 1.5 | 431.3 | 6 | ...... | ...... | ...... | ...... | 443 | 18 |
| 19 | Davis Coal & Coke Co. No. 28 | Fairfax........... | Davis C. & C.. | 3048L | 250.7 | 2 | 335.5 | 1 | 441.7 | 4.3 | ...... | ...... | ...... | ...... | 473.9 | 19 |
| 20 | Davis Coal & Coke Co. No. 42. | Fairfax........... | Davis C. & C.. | 2990L | ..... | 0 | 320.5 | 0.9 | 411.2 | 6.4 | ...... | ...... | ...... | ...... | 419.5 | 20 |
| 21 | Davis Coal & Coke Co. No. 26. | Fairfax........... | Davis C. & C.. | 3052L | ..... | 0 | ...... | 0 | 339.4 | 5.8 | ...... | ...... | ...... | ...... | 347 | 21 |
| 22 | Davis Coal & Coke Co. No. 25. | Fairfax........... | Davis C. & C.. | 3024L | ..... | 0 | ...... | 0 | 235.7 | 6.1 | ...... | ...... | ...... | ...... | 243 | 22 |
| 23 | Davis Coal & Coke Co. No. 32. | Fairfax........... | Davis C. & C.. | ..... | ..... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 23 |
| 24 | Davis Coal & Coke Co. No. 33. | Fairfax........... | Davis C. & C.. | ..... | ..... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 24 |
| 25 | Davis Coal & Coke Co. No. 36. | Fairfax........... | Davis C. & C.. | ..... | ..... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 25 |
| 26 | Davis Coal & Coke Co. No. 27. | Fairfax........... | Davis C. & C.. | 3012L | ..... | 0 | 318.8 | 0.9 | 419.3 | 7.8 | ...... | ...... | ...... | ...... | 429 | 26 |
| 27 | Davis Coal & Coke Co. No. 44. | Fairfax........... | Davis C. & C.. | 2980L | 233 | 0 | ...... | 0 | 448 | 0 | 530 | 0 | ...... | ...... | 560 | 27 |

# Summarized Record of Tests for Coal in Tucker County—Continued.

| No. on Map II. | Name of Property. | Magisterial District. | Company. | Elevation above Tide | Bakerstown (Thomas) Coal. | | Brush Creek Coal. | | Upper Free-port (Davis) Coal. | | Upper Kit-tanning Coal. | | Lower Kit-tanning Coal. | | Total Depth. | No. on Map II. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | Depth. Top. | Thickness. Feet. | | |
| 28 | Davis Coal & Coke Co. No. 40. | Fairfax........... | Davis C. & C.. | 2853L | ..... | ...... | 67 | 0 | 190.5 | 5.2 | ...... | 0 | ...... | 0 | 297 | 28 |
| 29 | Davis Coal & Coke Co. No. 41. | Fairfax........... | Davis C. & C.. | 2943L | 20 | 0 | 108 | 1 | 221 | 8 | ...... | ...... | ...... | ...... | 244 | 29 |
| 30 | Davis Coal & Coke Co. No. 39. | Fairfax........... | Davis C. & C.. | 2868L | ..... | ...... | ...... | ...... | 50 | 9 | 115 | 0 | ...... | ...... | 267 | 30 |
| 31 | Davis Coal & Coke Co. No. 38. | Union (Preston Co.) | Davis C. & C.. | 2922L | ..... | ...... | 52.1 | 0.9 | 156 | 15.7 | ...... | ...... | ...... | ...... | 176 | 31 |
| 32 | Davis Coal & Coke Co. No. 43. | Union (Preston Co.) | Davis C. & C.. | 2783L | ..... | ...... | 85 | 0.3 | 184 | 18.2 | ...... | ...... | ...... | ...... | 215.2 | 32 |
| 33 | Davis Coal & Coke Co. No. 45. | Garrett Co., Md.... | Davis C. & C.. | 2727L | 92 | 0 | 191.3 | 1.7 | 301.8 | 17.8 | ...... | ...... | ...... | ...... | 324.6 | 33 |
| 34 | Davis Coal & Coke Co. No. 46. | Garrett Co., Md.... | Davis C. & C.. | 2947L | ..... | 0 | 487 | 1.5 | 591.8 | 9 | ...... | ...... | ...... | ...... | 607.6 | 34 |
| 35 | Davis Coal & Coke Co. No. 59. | Garrett Co., Md.... | Davis C. & C.. | 2710L | 305.2 | 0.8 | 411 | 0 | 482 | 2 | ...... | ...... | ...... | ...... | 518 | 35 |
| 36 | Davis Coal & Coke Co. No. 60. | Garrett Co., Md.... | Davis C. & C.. | 2707L | 247 | 0.2 | ...... | 0 | 419 | 0 | ...... | ...... | ...... | ...... | 487 | 36 |
| 37 | Davis Coal & Coke Co. No. 61. | Garrett Co., Md.... | Davis C. & C.. | 2699L | ..... | 0 | 326 | 0 | 451 | 0 | 533 | 0 | ...... | ...... | 540 | 37 |
| 38 | Davis Coal & Coke Co. No. 47. | Garrett Co., Md.... | Davis C. & C.. | 2712L | 175 | 0 | 281.2 | 1.2 | 400.2 | 9.8 | ...... | ...... | ...... | ...... | 416 | 38 |
| 39 | Davis Coal & Coke Co. No. 48. | Union (Grant Co.). | Davis C. & C.. | 2966L | 396 | 0 | 494 | 1.7 | 606.5 | 15 | ...... | ...... | ...... | ...... | 629.5 | 39 |
| 40 | Davis Coal & Coke Co. No. 49. | Union (Grant Co.). | Davis C. & C.. | 2967L | 397 | 0 | 501 | 1 | 620.5 | 7.3 | ...... | ...... | ...... | ...... | 639.3 | 40 |
| 41 | Davis Coal & Coke Co. No. 50. | Union (Grant Co.). | Davis C. & C.. | 2814L | ..... | 0 | 273 | 2.5 | 393 | 0.7 | 453 | 0 | 521.5 | 1.1 | 664.1 | 41 |
| 42 | Davis Coal & Coke Co. No. 37. | Union (Grant Co.). | Davis C. & C.. | 3157L | 273.7 | 2.9 | 348.2 | 1.4 | 425.8 | 2.1 | ...... | ...... | ...... | ...... | 492 | 42 |
| 43 | Davis Coal & Coke Co. No. 120 | Union (Grant Co.). | Davis C. & C.. | 3175L | 292 | 5.2 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 299 | 43 |
| 44 | Davis Coal & Coke Co. No. 51. | Union (Grant Co.). | Davis C. & C.. | 2868L | ..... | ...... | 55.5 | 1.2 | 177.6 | 4.2 | 256.2 | 0.8 | 341.2 | 1.6 | 439.6 | 44 |
| 45 | Davis Coal & Coke Co. No. 15. | Davis............ | Davis C. & C.. | 3123L | ..... | ...... | 34 | 0.2 | 105.4 | 6.8 | ...... | ...... | ...... | ...... | 114.5 | 45 |
| 46 | Davis Coal & Coke Co. No. 17. | Davis............ | Davis C. & C.. | ..... | ..... | ...... | ...... | ...... | 128 | 1 | 178 | 0.5 | ...... | ...... | 200 | 46 |
| 47 | Davis Coal & Coke Co. No. 16. | Davis............ | Davis C. & C.. | ..... | ..... | ...... | ...... | ...... | 113 | 0.9 | ...... | ...... | ...... | ...... | 157.5 | 47 |
| 48 | Davis Coal & Coke Co. No. 13. | Davis............ | Davis C. & C.. | 3055B | ..... | ...... | ...... | ...... | 107 | 14.2 | ...... | ...... | ...... | ...... | 123.2 | 48 |
| 49 | Davis Coal & Coke Co. No. 14. | Davis............ | Davis C. & C.. | ..... | ..... | ...... | ...... | 0 | 132 | 0.5 | ...... | ...... | ...... | ...... | 160 | 49 |
| 50 | Davis Coal & Coke Co. No. 21. | Davis............ | Davis C. & C.. | ..... | ..... | ...... | 41 | 4.5 | 190 | 3.8 | ...... | 0 | ...... | ...... | 262 | 50 |
| 51 | Davis Coal & Coke Co. No. 116 | Davis............ | Davis C. & C.. | 3258L | 105 | 4.3 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 110.5 | 51 |
| 52 | Davis Coal & Coke Co. No. 117 | Davis............ | Davis C. & C.. | 3262L | 200.8 | 6.8 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 208.3 | 52 |
| 53 | Davis Coal & Coke Co. No. 18. | Davis............ | Davis C. & C.. | 3125B(?) | ..... | ...... | ...... | ...... | 67 | 6.9 | ...... | ...... | ...... | ...... | 77 | 53 |
| 54 | Davis Coal & Coke Co. No. 19. | Davis............ | Davis C. & C.. | 3195L | ..... | ...... | ...... | 0 | 169.6 | 7.9 | ...... | ...... | ...... | ...... | 179 | 54 |
| 55 | Davis Coal & Coke Co. No. 23. | Davis............ | Davis C. & C.. | 3141L | ..... | ...... | 31 | 0.6 | 150.5 | 0.8 | ...... | ...... | ...... | ...... | 190 | 55 |

## Summarized Record of Tests for Coal in Tucker County—Concluded.

| No. on Map II. | Name of Property. | Magisterial District. | Company. | Elevation above Tide | Bakerstown (Thomas) Coal. Depth. Top. | Bakerstown (Thomas) Coal. Thickness. Feet. | Brush Creek Coal. Depth. Top. | Brush Creek Coal. Thickness. Feet. | Upper Free-port (Davis) Coal. Depth. Top. | Upper Free-port (Davis) Coal. Thickness. Feet. | Upper Kit-tanning Coal. Depth. Top. | Upper Kit-tanning Coal. Thickness. Feet. | Lower Kit-tanning Coal. Depth. Top. | Lower Kit-tanning Coal. Thickness. Feet. | Total Depth. | No. on Map II. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | Davis Coal & Coke Co. No. 22 | Davis | Davis C. & C. | 3148L | | | | 0 | 165.8 | 0.9 | | | | | 201 | 56 |
| 57 | Davis Coal & Coke Co. No. 24 | Davis | Davis C. & C. | 3119L | | | | 0 | 130.4 | 2.9 | | | | | 137 | 57 |
| 58 | Davis Coal & Coke Co. No. 118 | Davis | Davis C. & C. | 3191L | 55.5 | 5.4 | | | | | | | | | 62.2 | 58 |
| 59 | Davis Coal & Coke Co. No. 54 | Davis | Davis C. & C. | 3113L | | | | 0 | 122.1 | 7.9 | | | | | 131 | 59 |
| 60 | Davis Coal & Coke Co. No. 53 | Davis | Davis C. & C. | 3144L | 25.1 | 5.3 | 97.8 | 2 | 235.7 | 4.8 | | | | | 247 | 60 |
| 61 | Davis Coal & Coke Co. No. 119 | Davis | Davis C. & C. | 3168L | 140 | 4.8 | | | | | | | | | 146 | 61 |
| 62 | Davis Coal & Coke Co. No. 55 | Davis | Davis C. & C. | 3116L | | | 24.3 | 2.2 | 146.9 | 6.6 | | | | | 155.5 | 62 |
| 63 | Davis Coal & Coke Co. No. 52 | Davis | Davis C. & C. | 3187L | | 0 | 127.6 | 1.8 | 259.8 | 4.2 | 334.9 | 1.6 | | 0 | 483 | 63 |
| 64 | Davis Coal & Coke Co. No. 56 | Davis | Davis C. & C. | 3150L | | | 72.6 | 1.2 | 197.2 | 6.2 | | | | | 205 | 64 |
| 65 | Davis Coal & Coke Co. No. 121 | Davis | Davis C. & C. | | 36.2 | 3.1 | 107.6 | 1.3 | 222.3 | 7.1 | | | | | 234 | 65 |
| 66 | Herr & Co. No. 1 | Davis | Wayne Coal | 3129L | | | | | 19.5 | 2.2 | | | | | 25 | 66 |
| 67 | Herr & Co. No. 2 | Davis | Wayne Coal | 3139L | | | | | 9 | 5 | | | | | 15 | 67 |
| 68 | Herr & Co. No 3 | Davis | Wayne Coal | 3151L | | | | | 10 | 8 | | | | | 20 | 68 |
| 69 | Herr & Co. No. 4 | Davis | Wayne Coal | 3173L | | | | | 17 | 7.3 | | | | | 26 | 69 |
| 70 | Herr & Co. No. 6 | Davis | Wayne Coal | 3210L | | | | | 36.5 | 8.2 | | | | | 45 | 70 |
| 71 | Herr & Co. No. 5 | Davis | Davis C. & C. | 3252L | | | | | 35.5 | 8.9 | | | | | 44.4 | 71 |
| 72 | Herr & Co. No. 7 | Davis | Wayne Coal | | | | | | | 0 | | | | | 70 | 72 |
| 73 | Herr & Co. No. 8 | Davis | Wayne Coal | 3357L | | | | | 47 | 7.3 | | | | | 54.9 | 73 |
| 74 | Herr & Co. No. 9 | Davis | Wayne Coal | 3400B | | | | | 47 | 7.3 | | | | | 55 | 74 |
| 75 | Herr & Co. No. 12 | Davis | Wayne Coal | 3396L | | | | | 29.5 | 5.1 | | | | | 35 | 75 |
| 76 | Herr & Co. No. 10 | Davis | Wayne Coal | 3409L | | | | | 8.5 | 5.2 | | | | | 14 | 76 |
| 77 | Herr & Co. No. 11 | Davis | Wayne Coal | 3410B | | | | | | | | | | | 54 | 77 |
| 78 | Herr & Co. No. 18 | Davis | Wayne Coal | | | | | | | | | | | | | 78 |
| 79 | Herr & Co. No. 17 | Davis | Wayne Coal | | | | | | | | | | | | | 79 |
| 80 | Herr & Co. No. | Davis | Wayne Coal | | | | | | | | | | | | | 80 |
| 81 | Robert Bridges Hrs. No. 2 | Dry Fork | Bridges Hrs. | 3715B | | | | | 79.1 | 8.2 | 179.8 | 2.5 | | | 190 | 81 |
| 82 | Robert Bridges Hrs. No. 3 | Dry Fork | Bridges Hrs. | 3665B. | | | | | 42.1 | 1.9 | | 0 | | | 149 | 82 |
| 83 | Robert Bridges Hrs. No. 1 | Dry Fork | Bridges Hrs. | 3680B | | | | 0 | 127.3 | 1.4 | | | | | 211 | 83 |
| 84 | Robert Bridges Hrs. No. 4 | Dry Fork | Bridges Hrs. | 3805B | | | 70 | 2.3 | | | | | | | 84 | 84 |

## DETAILED COAL TEST RECORDS, FAIRFAX DISTRICT.

In Fairfax District 18 coal tests have been bored and 14 others have been made in close proximity in Preston and Grant Counties, West Virginia, and Garrett County, Maryland. The detailed records of most of these, furnished by The Davis Coal & Coke Company, through its Chief Engineer, Mr. S. B. Jeffries, of Thomas, follow:

### Davis Coal & Coke Company No. 1 Coal Test Boring (1).

Fairfax District; on Middle Run of North Fork of Blackwater River, 1.3 miles northwest of Douglas; authority, Davis Coal & Coke Company; completed, December 22, 1914; elevation, 3180′ B.

| | Thickness. Ft. | Thickness. In. | Total. Ft. | Total. In. |
|---|---|---|---|---|
| Sand and gravel | 11 | 0 | 11 | 0 |
| Shale, light | 10 | 0 | 21 | 0 |
| Upper and Lower Mahoning Sandstones: Sandstone, shaly... 13′ 0″; Sandstone, hard.... 22 0; Sandstone ........ 54 7 | 89 | 7 | 110 | 7 |
| Slate | 0 | 1 | 110 | 8 |
| Upper Freeport (Davis): Coal ........ 4′ 1″; Binder ........ 1 0; Coal ........ 0 1; Binder ........ 0 3½; Coal ........ 2 0 | 7 | 5½ | 118 | 1½ |
| Fire clay, to bottom | 4 | 10½ | 123 | 0 |

### Davis Coal & Coke Company No. 3 Test Boring (2).

Fairfax District; on a branch of Snyder Run of North Fork of Blackwater River, 1.6 miles northwest of Coketon; authority, Davis Coal & Coke Company; completed, February, 1910; elavation, 3149′ L.

| | Thickness. Ft. | Thickness. In. | Total. Ft. | Total. In. |
|---|---|---|---|---|
| Clay | 6 | 0 | 6 | 0 |
| Gravel | 2 | 0 | 8 | 0 |
| Shale, clay | 6 | 0 | 14 | 0 |
| Buffalo Sandstone: Sandstone, medium-hard. 13′ 0″; Sandstone, coarse....... 11 0; Shale, gray.............. 3 0; Shale, sandy............ 7 0; Sandstone, with shale bands ................ 4 0 | 38 | 0 | 52 | 0 |
| Shale, dark, Brush Creek | 5 | 9 | 57 | 9 |
| Brush Creek: Bone coal..... 0′ 2″; Shale, dark... 0 3; Coal ......... 1 3 | 1 | 8 | 59 | 5 |
| Shale, gray | 2 | 7 | 62 | 0 |
| Upper Mahoning: Sandstone, fine-grained.. 22′ 0″; Sandstone, gray......... 8 0 | 30 | 0 | 92 | 0 |

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Shale, gray | 9 0 | 101 0 |
| Shale, soft, with lime | 5 0 | 106 0 |
| Shale, light | 7 0 | 113 0 |
| Sandstone, coarse, Lower Mahoning | 47 6 | 160 6 |
| Shale, soft | 1 0 | 161 6 |
| Shale, dark | 0 8 | 162 2 |
| Coal 5' 5"; Shale, gray 0 9; Coal 0 1; Shale 0 2½; Coal 2 1½ — Upper Freeport (Davis) | 8 7 | 170 9 |
| Fire clay, to bottom | 4 3 | 175 0 |

## Davis Coal & Coke Company No. 2 Test Boring (3).

Fairfax District; on a branch of Snyder Run of North Fork of Blackwater River, 1.8 miles northwest of Coketon; authority, Davis Coal & Coke Company; completed, February, 1910; elevation, 3159' L.

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Clay, sand, and gravel | 20 0 | 20 0 |
| Shale, light and sandy | 12 0 | 32 0 |
| Sandstone, medium 11' 0"; Sandstone, coarse 27 0 — Lower Mahoning | 38 0 | 70 0 |
| Shale, gray | 3 0 | 73 0 |
| Shale, dark, Uffington | 5 6 | 78 6 |
| Shale, gray, soft | 1 6 | 80 0 |
| Bone coal 0' 6"; Coal 2 8; Slate 0 2½; Coal 3 4½; Shale, dark 3 1; Coal 3 5 — Upper Freeport (Davis) | 13 3 | 93 3 |
| Fire clay, to bottom | 1 9 | 95 0 |

## Davis Coal & Coke Company No. 4 Test Boring (4).

Fairfax District; on Sugarland road, 0.7 mile west of Benbush; authority, Davis Coal & Coke Company; completed, February, 1910; elevation, 3100' L.

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Clay, yellow | 4 0 | 4 0 |
| Clay and sand | 3 0 | 7 0 |
| Sandstone, soft, broken 2' 0"; Sandstone 1 0; Sandstone, coarse, broken 3 0; Conglomerate 10 0; Sandstone, broken 4 0 — Buffalo | 20 0 | 27 0 |
| Shale, sandy | 6 0 | 33 0 |
| Shale, dark, Brush Creek | 3 5 | 36 5 |

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Bone coal.... 0' 4"<br>Shale, dark.. 0 2<br>Coal ........ 0 10 | Brush Creek.. ........ | 1 4 | 37 9 |
| Shale, light | | 1 3 | 39 0 |
| Shale, sandy | | 5 0 | 44 0 |
| Sandstone, hard, fine.. 5' 0"<br>Shale, sandy........... 7 0<br>Sandstone, hard, fine.. 3 0<br>Sandstone, coarse...... 7 0 | Upper Mahoning.... | 22 0 | 66 0 |
| Shale, gray | | 1 0 | 67 0 |
| Sandstone, hard | | 7 0 | 74 0 |
| Shale, sandy | | 3 0 | 77 0 |
| Sandstone, coarse..... 32' 0"<br>Shale, gray........... 2 0<br>Sandstone, coarse..... 26 2 | Lower Mahoning .... | 60 2 | 137 2 |
| Shale, gray | | 0 1 | 137 3 |
| Coal ........ 0' 3"<br>Shale, gray... 0 3<br>Coal ......... 1 9<br>Shale, gray... 0 1<br>Coal ......... 0 7<br>Shale, gray... 0 2½<br>Coal ......... 3 1½<br>Shale, dark... 3 10½<br>Coal ........ 0 0½<br>Shale, gray... 0 1<br>Coal ......... 2 8½ | Upper Freeport (Davis) ........... | 12 11½ | 150 2½ |
| Shale, light, to bottom | | 0 9½ | 151 0 |

## Davis Coal & Coke Company No. 7 Coal Test Boring (5).

Fairfax District; on Snyder Run of North Fork of Blackwater River, at Benbush; authority, Davis Coal & Coke Company; completed, January, 1910; elevation, 2994' L.

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Clay and boulders | | 17 0 | 17 0 |
| Shale, clay | | 0 10 | 17 10 |
| Coal, Bakerstown (Thomas) (split from) | | 0 2 | 18 0 |
| Shale, clay | | 2 0 | 20 0 |
| Sandstone | | 1 0 | 21 0 |
| Shale, blue | | 2 0 | 23 0 |
| Shale, sandy | | 9 0 | 32 0 |
| Shale, blue | | 11 0 | 43 0 |
| Shale, lime | | 11 0 | 54 0 |
| Shale, sandy | | 1 0 | 55 0 |
| Sandstone, coarse.... 11' 0"<br>Conglomerate ........ 2 0<br>Sandstone, coarse.... 5 0<br>Conglomerate ........ 2 6<br>Sandstone, fine....... 5 6<br>Sandstone, hard, white 9 0 | Buffalo ....... | 35 0 | 90 0 |
| Shale, gray | | 1 0 | 91 0 |

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sandstone | 3 | 0 | 94 | 0 |
| Shale, soft, gray | 9 | 0 | 103 | 0 |
| Shale, broken, limy | 6 | 0 | 109 | 0 |
| Shale, sand | 18 | 0 | 127 | 0 |
| Sandstone, fine, hard, with shale bands... 18′ 0″ | | | | |
| Sandstone ........... 54 8 | | | | |
| } Upper and Lower Mahoning | 72 | 8 | 199 | 8 |
| Shale, dark | 1 | 2 | 200 | 10 |
| Bone coal.. 0′ 11″ | | | | |
| Coal ...... 1 5 | | | | |
| Shale ..... 0 0½ | | | | |
| Coal ...... 0 2 | | | | |
| Shale ..... 0 0½ | | | | |
| Coal ...... 0 5 | | | | |
| Shale ..... 0 5½ | | | | |
| Coal ...... 3 3 | | | | |
| Shale ..... 1 7 | | | | |
| Coal ...... 1 8 | | | | |
| Shale ..... 0 1 | | | | |
| Coal ...... 0 10 | | | | |
| } Upper Freeport (Davis) | 10 | 10½ | 211 | 8½ |
| Shale, clay, to bottom | 1 | 3½ | 213 | 0 |

## Davis Coal & Coke Company No. 8 Coal Test Boring (6).

Fairfax District; on small branch of Snyder Run of North Fork of Blackwater River, 0.2 mile northeast of Benbush; authority, Davis Coal & Coke Company; completed, January 3, 1910; elevation, 3083′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay, yellow | 5 | 0 | 5 | 0 |
| Sandstone, broken.... 0′ 10″ | | | | |
| Sandstone, yellow..... 9 2 | | | | |
| Sandstone, hard, gray 3 0 | | | | |
| } Grafton | 13 | 0 | 18 | 0 |
| Shale, soft, light | 4 | 0 | 22 | 0 |
| Shale, gray | 14 | 0 | 36 | 0 |
| Shale, blue | 2 | 6 | 38 | 6 |
| Shale, soft, dark, Ames | 0 | 7 | 39 | 1 |
| Coal, Harlem | 1 | 1 | 40 | 2 |
| Shale, soft, gray | 16 | 10 | 57 | 0 |
| Shale, red | 16 | 0 | 73 | 0 |
| Shale, green | 7 | 0 | 80 | 0 |
| Shale, red, with lime spots | 3 | 0 | 83 | 0 |
| Shale, red | 1 | 0 | 84 | 0 |
| Shale, gray | 14 | 0 | 98 | 0 |
| Shale, soft, gray | 2 | 0 | 100 | 0 |
| Shale, sandy | 1 | 0 | 101 | 0 |
| Sandstone | 1 | 0 | 102 | 0 |
| Shale, sandy | 9 | 0 | 111 | 0 |
| Shale, soft, dark-gray | 5 | 0 | 116 | 0 |
| Shale, soft, light, with lime spots | 15 | 0 | 131 | 0 |
| Shale, soft, light | 5 | 0 | 136 | 0 |
| Shale, gray | 3 | 0 | 139 | 0 |
| Shale, sandy | 10 | 0 | 149 | 0 |
| Sandstone, Saltsburg | 3 | 0 | 152 | 0 |
| Shale, dark | 0 | 7 | 152 | 7 |

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Bone ....0′ 8″ } Bakerstown (Thomas)...... Coal .....5 0 } | 5 8 | 158 3 |
| Shale, gray, with soft streaks............... | 3 9 | 162 0 |
| Fire clay, flinty........................... | 2 0 | 164 0 |
| Shale, soft, gray.......................... | 4 0 | 168 0 |
| Shale, sandy.............................. | 6 0 | 174 0 |
| Shale, gray............................... | 13 0 | 187 0 |
| Shale, soft, gray.......................... | 6 0 | 193 0 |
| Shale, sandy.............................. | 1 0 | 194 0 |
| Sandstone, coarse..22′ 0″ } Conglomerate ...... 5 0 } Buffalo ......... Sandstone .........15 0 } | 42 0 | 236 0 |
| Shale, sandy.............................. | 4 0 | 240 0 |
| Shale, gray............................... | 5 0 | 245 0 |
| Shale, soft, gray.......................... | 4 0 | 249 0 |
| Shale, lime, with gray shale partings....... | 21 0 | 270 0 |
| Shale, lime .............................. | 6 0 | 276 0 |
| Shale, gray............................... | 2 0 | 278 0 |
| Shale, sandy.............................. | 5 0 | 283 0 |
| Shale, blue............................... | 3 0 | 286 0 |
| Shale, soft, gray.......................... | 2 0 | 288 0 |
| Shale, sand............................... | 4 0 | 292 0 |
| Sandstone, Lower Mahoning................. | 55 6 | 347 6 |
| Shale, broken............................. | 0 3 | 347 9 |
| Bone ..................................... | 0 2 | 347 11 |
| Coal ......... 5′ 4½″ } Shale, gray... 2 10 } Coal ........ 0 5 } Sulphur ..... 0 1 } Upper Freeport Coal ......... 1 4 } (Davis)............ Shale, dark... 0 2 } Coal ........ 0 6 } Sulphur ...... 0 0¼ } Coal ......... 0 3¾ } | 11 0½ | 358 11½ |
| Shale, clay, to bottom..................... | 6 0½ | 365 0 |

## Davis Coal & Coke Company No. 5 Coal Test Boring (7).

Fairfax District; on Snyder Run of North Fork of Blackwater River, 0.3 mile northwest of Benbush; authority, Davis Coal & Coke Company; completed, January, 1910; elevation, 2992′ L.

| | Thickness. Ft. In. | Total. Ft. in. |
|---|---|---|
| Clay, yellow............................... | 4 0 | 4 0 |
| Coal, dirty, Brush Creek.................... | 1 6 | 5 6 |
| Shale, gray................................ | 13 6 | 19 0 |
| Sandstone, fine............................ | 1 0 | 20 0 |
| Shale, soft, light.......................... | 3 0 | 23 0 |
| Sandstone, fine...... 6′ 0″ } Shale, sandy........ 3 0 } Upper Mahoning. Sandstone, hard....12 0 } | 21 0 | 44 0 |
| Shale, tough, blue......................... | 4 0 | 48 0 |
| Shale, soft, dark-gray...................... | 1 0 | 49 0 |

| | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|
| Sandstone, hard, fine ............ 13' 0"<br>Sandstone, coarse. 41 4 | Lower Mahoning. | 54 | 4 | 103 | 4 |
| Shale, dark-gray, Uffington................. | | 9 | 10 | 113 | 2 |
| Bone ........................................ | | 0 | 10 | 114 | 0 |
| Coal ...... 2' 2¾"<br>Shale, dark 0 3<br>Coal ...... 2 3<br>Shale, dark 3 5¼<br>Coal .......0 11<br>Shale, dark 0 2½<br>Coal ...... 1 8½ | Upper Freeport (Davis) | 11 | 0 | 125 | 0 |
| Shale, clay, to bottom...................... | | 1 | 0 | 126 | 0 |

## Davis Coal & Coke Company No. 6 Coal Test Boring (8).

Fairfax District; on a branch of Snyder Run of North Fork of Blackwater River, 0.5 mile north of Benbush; authority, Davis Coal & Coke Company; completed, January, 1910; elevation, 3032' L.

| | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|
| Clay, yellow................................ | | 4 | 0 | 4 | 0 |
| Shale, gray, broken......................... | | 10 | 0 | 14 | 0 |
| Shale, limy................................. | | 3 | 0 | 17 | 0 |
| Limestone, hard, broken, Albright?.......... | | 6 | 0 | 23 | 0 |
| Shale, limy................................. | | 6 | 0 | 29 | 0 |
| Shales, limy and red........................ | | 8 | 0 | 37 | 0 |
| Shale, soft, gray........................... | | 11 | 0 | 48 | 0 |
| Shale, blue................................. | | 9 | 0 | 57 | 0 |
| Shale, red.................................. | | 9 | 0 | 66 | 0 |
| Shale, gray................................. | | 1 | 0 | 67 | 0 |
| Sandstone, hard............................. | | 5 | 0 | 72 | 0 |
| Shale, gray................................. | | 6 | 0 | 78 | 0 |
| Shale, soft, red............................ | | 3 | 0 | 81 | 0 |
| Shale, gray................................. | | 2 | 0 | 83 | 0 |
| Shale, sandy................................ | | 3 | 0 | 86 | 0 |
| Shale, gray................................. | | 6 | 0 | 92 | 0 |
| Sandstone, Buffalo.......................... | | 17 | 0 | 109 | 0 |
| Shale, sandy, Brush Creek................... | | 4 | 9 | 113 | 9 |
| Coal, Brush Creek........................... | | 1 | 0½ | 114 | 9½ |
| Shale, gray................................. | | 5 | 2½ | 120 | 0 |
| Shale, soft, gray........................... | | 21 | 0 | 141 | 0 |
| Shale, sand................................. | | 15 | 0 | 156 | 0 |
| Sandstone, hard.10' 0"<br>Sandstone, gray 1 0 | Upper Mahoning.... | 11 | 0 | 167 | 0 |
| Shale, gray................................. | | 3 | 0 | 170 | 0 |
| Sandstone ......32' 0"<br>Shale, gray...... 7 0<br>Sandstone ...... 8 0<br>Sandstone and shale mixed... 3 0 | Lower Mahoning... | 50 | 0 | 220 | 0 |
| Shale, gray................................. | | 1 | 6 | 221 | 6 |

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Coal ...... 0' 4" / Shale, gray 0 2 / Coal ...... 2 4½ / Shale ..... 0 2½ / Coal ...... 0 10 / Shale ..... 0 4 / Coal ...... 2 1½ / Shale ..... 3 6½ / Coal ...... 1 7½ / Shale ..... 0 0½ / Coal ...... 0 6 / Shale .... 0 1½ / Coal ...... 0 1½ / Sulphur ... 0 1 / Coal ...... 0 1 } Upper Freeport (Davis) | 12 6 | 234 0 |
| Shale, light, to bottom | 1 0 | 235 0 |

## Davis Coal & Coke Company No. 10 Coal Test Boring (9).

Fairfax District; on North Fork of Blackwater River, at north edge of Thomas; authority, Davis Coal & Coke Company; completed, December 21, 1914; elevation, 2990' B.

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Surface | 28 0 | 28 0 |
| Shale, gray | 27 0 | 55 0 |
| Coal and bone 2' 6" / Coal ......... 2 6 } Bakerstown (Thomas) | 5 0 | 60 0 |
| Fire clay | 7 0 | 67 0 |
| Shale, sandy | 16 0 | 83 0 |
| Sandstone ........... 9' 0" / Sandstone, hard...... 19 0 } Buffalo | 28 0 | 111 0 |
| Limestone ........... 1' 0" / Shale, dark........... 22 0 } Brush Creek | 23 0 | 134 0 |
| Sandstone, shaly, Upper Mahoning | 40 0 | 174 0 |
| Shale and clay | 13 0 | 187 0 |
| Shale, gray, sandy | 12 0 | 199 0 |
| Sandstone, hard, Lower Mahoning | 30 0 | 229 0 |
| Shale, light | 4 0 | 233 0 |
| Slate, black | 2 0 | 235 0 |
| Coal ...... 0' 2" / Binder .... 0 1½ / Coal ...... 1 8 / Binder .... 0 1½ / Coal ...... 3 4 / Slate ..... 2 5 / Coal ...... 2 11 } Upper Freeport (Davis) | 10 9 | 245 9 |
| Fire clay, to bottom | 1 3 | 247 0 |

## Davis Coal & Coke Company No. 9 Coal Test Boring (10).

Fairfax District; on a short branch of North Fork of Blackwater River, 0.9 mile northward from Thomas; authority, Davis Coal & Coke

Company; completed, March, 1910; elevation, 3105′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay, yellow | 5 | 0 | 5 | 0 |
| Shale, soft, red | 12 | 0 | 17 | 0 |
| Shale, soft, gray | 11 | 0 | 28 | 0 |
| Sandstone | 5 | 0 | 33 | 0 |
| Shale, soft, gray | 23 | 0 | 56 | 0 |
| Sandstone, medium 27′ 0″ } Upper Grafton | 38 | 0 | 94 | 0 |
| Sandstone, coarse.. 11 0 } | | | | |
| Shale, soft, dark | 3 | 0 | 97 | 0 |
| Shale, red | 14 | 0 | 111 | 0 |
| Limestone | 1 | 0 | 112 | 0 |
| Sandstone, fine, Grafton | 4 | 0 | 116 | 0 |
| Shale, sandy | 6 | 0 | 122 | 0 |
| Shale, soft, gray | 14 | 0 | 136 | 0 |
| Shale, dark, Ames | 0 | 3 | 136 | 3 |
| Coal, Harlem | 0 | 6 | 136 | 9 |
| Shale, soft, gray | 17 | 3 | 154 | 0 |
| Shale, red | 3 | 0 | 157 | 0 |
| Shale, soft, gray | 5 | 0 | 162 | 0 |
| Shale, red and gray | 16 | 0 | 178 | 0 |
| Shale, hard, sandy | 19 | 0 | 197 | 0 |
| Sandstone, Saltsburg | 11 | 0 | 208 | 0 |
| Shale, gray | 38 | 4 | 246 | 4 |
| Shale, dark | 1 | 6 | 247 | 10 |
| Bone ....... 1′ 2″ } | | | | |
| Coal ....... 1 0 } Bakerstown (Thomas) | 4 | 4½ | 252 | 2½ |
| Bone ....... 0 8 } | | | | |
| Coal ....... 1 6½ } | | | | |
| Shale, light | 8 | 9½ | 261 | 0 |
| Shale, blue | 11 | 0 | 272 | 0 |
| Shale, sandy | 4 | 0 | 276 | 0 |
| Shale, gray | 12 | 0 | 288 | 0 |
| Sandstone | 4 | 0 | 292 | 0 |
| Shale, red | 13 | 0 | 305 | 0 |
| Shale, sandy | 11 | 0 | 316 | 0 |
| Sandstone, Buffalo | 20 | 0 | 336 | 0 |
| Shale, gray | 10 | 0 | 346 | 0 |
| Shale, red | 4 | 0 | 350 | 0 |
| Shale, sandy | 9 | 0 | 359 | 0 |
| Sandstone, Upper Mahoning | 3 | 0 | 362 | 0 |
| Shale, gray | 7 | 0 | 369 | 0 |
| Shale, variegated, Mahoning | 9 | 0 | 378 | 0 |
| Sandstone ... 5′ 0″ } | | | | |
| Shale, gray... 7 0 } Lower Mahoning | 43 | 0 | 421 | 0 |
| Sandstone ...31 0 } | | | | |
| Shale, dark-gray | 7 | 8 | 428 | 8 |
| Coal ......... 1′ 5″ } | | | | |
| Slate ........ 0 3 } | | | | |
| Coal ......... 2 0 } Upper Freeport (Davis) | 7 | 2 | 435 | 10 |
| Slate ........ 0 1 } | | | | |
| Coal ......... 3 5 } | | | | |
| Shale, gray | 3 | 2 | 439 | 0 |
| Shale, black | 2 | 0 | 441 | 0 |
| Shale, gray, sandy, to bottom | 2 | 0 | 443 | 0 |

## Davis Coal & Coke Company No. 34 Coal Test Boring (12).

Fairfax District; on a short branch of Pendleton Creek, 1.7 miles northeast of Thomas; authority, Davis Coal & Coke Company; completed, April 2, 1910; elevation, 3124′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 6 | 6 | 6 | 6 |
| Grafton: Sandstone, broken 10′ 6″; Shale, gray 7 0; Sandstone 16 0 | 33 | 6 | 40 | 0 |
| Shale, dark, Ames | 18 | 0 | 58 | 0 |
| Coal, Harlem | 1 | 5 | 59 | 5 |
| Shale, dark | 2 | 7 | 62 | 0 |
| Shale, tough | 13 | 0 | 75 | 0 |
| Shale, dark | 21 | 0 | 96 | 0 |
| Sandstone, broken | 13 | 0 | 109 | 0 |
| Sandstone, hard, broken, Jane Lew | 9 | 0 | 118 | 0 |
| Shale, soft, dark | 4 | 0 | 122 | 0 |
| Shale, dark-blue | 5 | 0 | 127 | 0 |
| Shale, hard bands | 4 | 0 | 131 | 0 |
| Shale, blue | 9 | 0 | 140 | 0 |
| Sandstone, hard | 2 | 0 | 142 | 0 |
| Shale, blue | 9 | 0 | 151 | 0 |
| Shale, dark | 14 | 0 | 165 | 0 |
| Shale, hard, sandy | 6 | 0 | 171 | 0 |
| Saltsburg: Sandstone, shaly 7′ 0″; Sandstone 8 0 | 15 | 0 | 186 | 0 |
| Shale, dark | 4 | 5 | 190 | 5 |
| Coal, Bakerstown (Thomas) | 4 | 2 | 194 | 7 |
| Shale, gray | 13 | 5 | 208 | 0 |
| Buffalo: Sandstone 17′ 0″; Sandstone, shaly 7 0; Sandstone 26 0; Sandstone, shaly 1 9 | 51 | 9 | 259 | 9 |
| Coal, Brush Creek | 1 | 4 | 261 | 1 |
| Shale, gray, hard bands | 15 | 11 | 277 | 0 |
| Shale, gray | 3 | 0 | 280 | 0 |
| Sandstone, shaly | 21 | 0 | 301 | 0 |
| Sandstone | 1 | 0 | 302 | 0 |
| Shale, gray | 4 | 0 | 306 | 0 |
| Shale, sandy | 9 | 0 | 315 | 0 |
| Upper Mahoning: Sandstone 8′ 0″; Sandstone, coarse 10 0; Sandstone, broken 7 0; Sandstone 4 0 | 29 | 0 | 344 | 0 |
| Shale, dark | 3 | 4 | 347 | 4 |
| Coal, shaly, Mahoning | 0 | 2 | 347 | 6 |
| Sandstone, shaly, Lower Mahoning | 15 | 6 | 363 | 0 |
| Shale, sandy | 17 | 0 | 380 | 0 |
| Shale, dark | 12 | 3 | 392 | 3 |
| Upper Freeport (Davis): Bone coal 0′ 2″; Coal 3 1 | 3 | 3 | 395 | 6 |
| Shale, dark | 8 | 6 | 404 | 0 |
| Sandstone, shaly | 6 | 0 | 410 | 0 |
| Shale, dark | 5 | 0 | 415 | 0 |
| Sandstone, shaly, Upper Freeport | 25 | 0 | 440 | 0 |

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Sandstone, hard | 6 | 0 | 446 | 0 |
| Shale, sandy | 3 | 0 | 449 | 0 |
| Shale, dark | 4 | 0 | 453 | 0 |
| Shale, sandy | 3 | 0 | 456 | 0 |
| Shale, dark | 5 | 0 | 461 | 0 |
| **Bone coal, Lower Freeport or Upper Kittaning** | 1 | 0 | 462 | 0 |
| Shale, dark, to bottom | 1 | 0 | 463 | 0 |

## Davis Coal & Coke Company No. 35 Coal Test Boring (13).

Fairfax District; on Pendleton Creek, 1.6 miles southeast of William; authority, Davis Coal & Coke Company, completed, March 29, 1910; elevation, 3108′ L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Clay | 4 | 6 | 4 | 6 |
| Sandstone, **Saltsburg** | 22 | 6 | 27 | 0 |
| Shale, gray | 17 | 0 | 44 | 0 |
| Shale, sandy | 25 | 0 | 69 | 0 |
| Sandstone | 1 | 0 | 70 | 0 |
| Shale, gray | 3 | 3 | 73 | 3 |
| **Coal** 2′ 2″; Bone 0 2; **Coal** 0 6; Bone 0 2; **Coal** 2 9 — **Bakerstown (Thomas).** | 5 | 9 | 79 | 0 |
| Shale, gray | 15 | 0 | 94 | 0 |
| Sandstone, hard | 5 | 0 | 99 | 0 |
| Shale, sandy | 4 | 0 | 103 | 0 |
| Shale, soft, gray | 7 | 0 | 110 | 0 |
| Shale, hard, sandy | 16 | 0 | 126 | 0 |
| Shale, gray | 2 | 0 | 128 | 0 |
| Shale, hard, sandy | 12 | 7 | 140 | 7 |
| **Coal, Brush Creek** | 1 | 3 | 141 | 10 |
| Shale, gray | 9 | 2 | 151 | 0 |
| Sandstone, shaly....20′ 0″; Sandstone, coarse-grained 5 0 — **Upper Mahoning.** | 25 | 0 | 176 | 0 |
| Shale, gray | 4 | 0 | 180 | 0 |
| Sandstone, hard, fine-grained ......15′ 0″; Sandstone, coarse...14 0; Sandstone, hard, fine-grained ......27 0 — **Lower Mahoning.** | 56 | 0 | 236 | 0 |
| Shale, hard, sandy | 4 | 0 | 240 | 0 |
| Shale, dark | 10 | 0 | 250 | 0 |
| Shale, sandy | 12 | 0 | 262 | 0 |
| Shale, dark | 16 | 0 | 278 | 0 |
| Shale, gray | 4 | 6 | 282 | 6 |
| Shale, dark, **Upper Freeport (Davis) Coal horizon** | 4 | 0 | 286 | 6 |
| Shale, gray, to bottom | 9 | 6 | 296 | 0 |

## Davis Coal & Coke Company No. 12 Coal Test Boring (14).

Fairfax District; on North Fork of Blackwater River, 1.1 miles northeast of Thomas; authority, Davis Coal & Coke Company; completed, March, 1900; elevation, 2995′ B.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 16 | 0 | 16 | 0 |
| Clay, red | 11 | 0 | 27 | 0 |
| Sandstone, Grafton | 11 | 0 | 38 | 0 |
| Shale, sandy | 5 | 0 | 43 | 0 |
| Fire clay | 12 | 6 | 55 | 6 |
| Coal, Harlem | 0 | 8 | 56 | 2 |
| Clay, light and red | 34 | 4 | 90 | 6 |
| Sandstone | 5 | 0 | 95 | 6 |
| Clay, red | 3 | 6 | 99 | 0 |
| Shale, sandy | 5 | 6 | 104 | 6 |
| Sandstone, Saltsburg | 35 | 6 | 140 | 0 |
| Fire clay | 9 | 6 | 149 | 6 |
| Shale, sandy | 29 | 0 | 178 | 6 |
| Fire clay | 2 | 0 | 180 | 6 |
| Coal ......... 0′ 6″ / Slate ......... 0 3 / Coal ......... 0 5 / Slate ......... 0 4 / Coal ......... 4 0 — Bakerstown (Thomas). | 5 | 6 | 186 | 0 |
| Slate | 1 | 0 | 187 | 0 |
| Fire clay | 16 | 0 | 203 | 0 |
| Sandstone, Buffalo | 20 | 0 | 223 | 0 |
| Fire clay, red | 8 | 0 | 231 | 0 |
| Shale, sandy | 24 | 0 | 255 | 0 |
| Coal, Brush Creek | 1 | 0 | 256 | 0 |
| Fire clay | 9 | 0 | 265 | 0 |
| Shale, sandy | 8 | 0 | 273 | 0 |
| Fire clay | 23 | 0 | 296 | 0 |
| Shale, sandy | 12 | 0 | 308 | 0 |
| Fire clay | 18 | 0 | 326 | 0 |
| Slate and coal, Mahoning | 2 | 0 | 328 | 0 |
| Sandstone, Lower Mahoning | 28 | 0 | 356 | 0 |
| Shale, sandy, Uffington | 5 | 0 | 361 | 0 |
| Fire clay and slate | 5 | 0 | 366 | 0 |
| Coal, with 0′ 3″ slate, Upper Freeport (Davis) | 5 | 0 | 371 | 0 |
| Fire clay and slate | 8 | 0 | 379 | 0 |
| Sandstone, to bottom | 2 | 0 | 381 | 0 |

The record of the Davis Coal & Coke Company No. 11 Coal Test (No. 15 on Map II), located 1 miles northeast of Thomas, has been published as the Thomas Section, page 128.

## Davis Coal & Coke Company No. 31 Coal Test Boring (16).

Fairfax District; on short branch of North Fork of Blackwater River, 0.3 mile west of Sand Run Junction; authority, Davis Coal & Coke Company; completed, May 3, 1910; elevation, 3080′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay, yellow | 4 | 0 | 4 | 0 |
| Shale, mixed | 5 | 0 | 9 | 0 |
| Sandstone, **Morgantown?** | 39 | 0 | 48 | 0 |
| Shale, mixed | 12 | 0 | 60 | 0 |
| Sandstone, hard, **Barton** | 20 | 0 | 80 | 0 |
| Shale, dark | 2 | 0 | 82 | 0 |
| Shale, sandy, with lime bands | 10 | 0 | 92 | 0 |
| Shale, blue | 28 | 0 | 120 | 0 |
| Sandstone, coarse........12′ 0″ | | | | |
| Shale, sandy............ 8 0 } **Grafton** | 40 | 0 | 160 | 0 |
| Sandstone, medium-hard..20 0 | | | | |
| Shale, sandy | 6 | 0 | 166 | 0 |
| Shale, dark and sandy, **Ames** | 5 | 5 | 171 | 5 |
| **Coal, Harlem** | 1 | 2 | 172 | 7 |
| Shale, sticky, gray | 14 | 5 | 187 | 0 |
| Shale, mixed | 20 | 0 | 207 | 0 |
| Sandstone, **Jane Lew** | 33 | 0 | 240 | 0 |
| Shale, mixed | 11 | 0 | 251 | 0 |
| Shale, blue, mixed with lime | 14 | 0 | 265 | 0 |
| Shale, red | 14 | 0 | 279 | 0 |
| Shale, mixed | 18 | 0 | 297 | 0 |
| Shale, sandy | 9 | 0 | 306 | 0 |
| Sandstone ........... 8′ 0″ | | | | |
| Shale, mixed.......... 9 0 } **Buffalo** | 29 | 0 | 335 | 0 |
| Sandstone, hard........12 0 | | | | |
| Shale, sandy | 2 | 0 | 337 | 0 |
| Shale, mixed | 11 | 0 | 348 | 0 |
| Shale, sandy | 14 | 0 | 362 | 0 |
| Shale, gray | 12 | 1 | 374 | 1 |
| **Coal, Brush Creek** | 1 | 3 | 375 | 4 |
| Shale, gray | 32 | 8 | 408 | 0 |
| Shale, mixed | 8 | 0 | 416 | 0 |
| Shale, blue, sandy | 17 | 0 | 433 | 0 |
| Sandstone, **Upper Mahoning** | 33 | 0 | 466 | 0 |
| Shale, blue, sandy | 6 | 0 | 472 | 0 |
| Lime chert | 17 | 0 | 489 | 0 |
| Shale, dark, **Uffington** | 9 | 6 | 498 | 6 |
| Bone | 0 | 2 | 498 | 8 |
| **Coal** ........ 1′ 3″ | | | | |
| Slate ........ 0 1 } **Upper Freeport (Davis)** | 2 | 3 | 500 | 11 |
| **Coal** ........ 0 11 | | | | |
| Shale, soft, gray | 3 | 1 | 504 | 0 |
| Shale, gray | 20 | 0 | 524 | 0 |
| Shale, sandy | 12 | 0 | 536 | 0 |
| Shale, gray | 3 | 0 | 539 | 0 |
| Shale, dark | 2 | 0 | 541 | 0 |
| Sandstone | 3 | 0 | 544 | 0 |
| Shale, sandy | 9 | 0 | 553 | 0 |
| Shale, dark | 1 | 0 | 554 | 0 |
| Shale, gray | 8 | 0 | 562 | 0 |
| Shale, gray, sandy, with sandstone | 8 | 0 | 570 | 0 |
| **Bone, Upper Kittanning Coal** | 0 | 6 | 570 | 6 |
| Shale, gray, to bottom | 8 | 6 | 579 | 0 |

## Davis Coal & Coke Company No. 29 Coal Test Boring (18).

Fairfax District; on small branch of North Fork of Blackwater River, 0.9 mile northeast of Benbush; authority, Davis Coal & Coke Company; completed, March, 1910; elevation, 3094' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and broken sandstone | 6 | 0 | 6 | 0 |
| Sandstone, fine | 1 | 0 | 7 | 0 |
| Shale, red | 1 | 0 | 8 | 0 |
| Shale | 12 | 0 | 20 | 0 |
| Shale, soft, gray | 15 | 0 | 35 | 0 |
| Shale, red | 7 | 0 | 42 | 0 |
| Shale, gray | 10 | 0 | 52 | 0 |
| Sandstone | 2 | 0 | 54 | 0 |
| Shale, gray | 15 | 0 | 69 | 0 |
| Shale, tough, blue | 14 | 0 | 83 | 0 |
| Shale, sandy | 9 | 0 | 92 | 0 |
| Sandstone, coarse, Grafton | 14 | 0 | 106 | 0 |
| Shale, gray | 10 | 0 | 116 | 0 |
| Shale, sandy | 12 | 0 | 128 | 0 |
| Shale, soft, gray | 2 | 0 | 130 | 0 |
| Sandstone, coarse | 9 | 0 | 139 | 0 |
| Shale, gray | 29 | 0 | 168 | 0 |
| Shale, red | 6 | 0 | 174 | 0 |
| Shale, gray | 1 | 0 | 175 | 0 |
| Shale, red and green | 18 | 0 | 193 | 0 |
| Shale, sandy | 7 | 0 | 200 | 0 |
| Sandstone, Saltsburg | 20 | 0 | 220 | 0 |
| Shale, variegated | 10 | 0 | 230 | 0 |
| Shale, gray | 29 | 0 | 259 | 0 |
| Shale, gray, with coal partings | 1 | 6 | 260 | 6 |
| Bone coal..... 1' 3"; Coal ......... 2 2 } Bakerstown (Thomas) | 3 | 5 | 263 | 11 |
| Shale, light | 3 | 1 | 267 | 0 |
| Shale, gray, with sandstone bands | 28 | 0 | 295 | 0 |
| Sandstone, hard | 9 | 0 | 304 | 0 |
| Shale, red, Meyersdale | 10 | 0 | 314 | 0 |
| Shale, blue | 4 | 0 | 318 | 0 |
| Limestone and sandstone, mixed | 19 | 0 | 337 | 0 |
| Shale, dark | 10 | 6 | 347 | 6 |
| Coal, Brush Creek | 1 | 6 | 349 | 0 |
| Shale, gray, sandy | 19 | 0 | 368 | 0 |
| Sandstone, Upper Mahoning | 22 | 0 | 390 | 0 |
| Shale, gray, sandy | 8 | 0 | 398 | 0 |
| Sandstone, hard, fine .............27' 0"; Sandstone, coarse.. 6 4 } Lower Mahoning | 33 | 4 | 431 | 4 |
| Coal, shaly....... 0' 10"; Coal ............ 1 9; Slate ........... 0 0½; Coal ............ 3 0½; Bone coal........ 0 4 } Upper Freeport (Davis) | 6 | 0 | 437 | 4 |
| Shale, dark | 0 | 8 | 438 | 0 |
| Fire clay, to bottom | 5 | 0 | 443 | 0 |

## Davis Coal & Coke Company No. 28 Coal Test Boring (19).

Fairfax District; on small branch of Sand Run, 0.7 mile southeast of Pierce; authority, Davis Coal & Coke Company; completed April 8, 1910; elevation, 3048′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay, yellow | 8 | 0 | 8 | 0 |
| Sandstone, shaly | 4 | 0 | 12 | 0 |
| Shale, gray, sandy | 18 | 0 | 30 | 0 |
| Shale, dark | 4 | 0 | 34 | 0 |
| Shale, gray | 16 | 0 | 50 | 0 |
| Sandstone, mixed with lime. 29′ 0″; Sandstone, coarse 37 0; Conglomerate 6 0 — Grafton | 72 | 0 | 122 | 0 |
| Shale, gray, with hard bands | 7 | 4 | 129 | 4 |
| Coal, dirty, Harlem | 1 | 4 | 130 | 8 |
| Shale, tough, gray | 9 | 4 | 140 | 0 |
| Shale, blue | 2 | 0 | 142 | 0 |
| Shale, soft, gray | 7 | 0 | 149 | 0 |
| Shale, red and green, mixed with lime | 17 | 0 | 166 | 0 |
| Shale, blue | 2 | 0 | 168 | 0 |
| Sandstone, coarse, Jane Lew | 38 | 0 | 206 | 0 |
| Shale, gray | 15 | 0 | 221 | 0 |
| Shale, gray, mixed with lime | 21 | 0 | 242 | 0 |
| Sandstone, Saltsburg | 7 | 0 | 249 | 0 |
| Shale, gray | 1 | 0 | 250 | 0 |
| Shale, black | 0 | 8 | 250 | 8 |
| Coal, Bakerstown (Thomas) | 2 | 0 | 252 | 8 |
| Shale, light | 0 | 4 | 253 | 0 |
| Shale, dark | 2 | 0 | 255 | 0 |
| Shale, soft, gray | 5 | 0 | 260 | 0 |
| Sandstone, mixed with lime | 10 | 0 | 270 | 0 |
| Shale, soft, gray | 7 | 0 | 277 | 0 |
| Shale, mixed | 5 | 0 | 282 | 0 |
| Sandstone, hard | 6 | 0 | 288 | 0 |
| Shale, red and blue, mixed with lime | 8 | 0 | 296 | 0 |
| Shale, red, Meyersdale | 10 | 0 | 306 | 0 |
| Sandstone, mixed with lime. 9′ 0″; Shale, gray 8 0; Sandstone 11 0 — Buffalo | 28 | 0 | 334 | 0 |
| Shale, dark, Brush Creek | 1 | 6 | 335 | 6 |
| Coal, Brush Creek | 1 | 0 | 336 | 6 |
| Shale, gray | 1 | 6 | 338 | 0 |
| Shale, sandy | 8 | 0 | 346 | 0 |
| Shale, gray, mixed with lime | 17 | 0 | 363 | 0 |
| Shale, blue, mixed with lime | 15 | 0 | 378 | 0 |
| Sandstone, Lower Mahoning | 57 | 0 | 435 | 0 |
| Shale, gray | 6 | 2 | 441 | 2 |
| Bone | 0 | 6 | 441 | 8 |
| Coal 0′ 9″; Shale 0 1½; Coal 2 6½; Shale 0 4½; Coal 0 6½ — Upper Freeport (Davis) | 4 | 4 | 446 | 0 |
| Shale, dark | 3 | 5 | 449 | 5 |

PLATE XII.—Looking westward down Dry Fork from slope just east of Hendricks. Boulders of Greenbrier in smooth foreground. Slope of McGowan Mountain at left formed by Pottsville, Mauch Chunk, Greenbrier, Pocono, and Catskill. Lower ridges in background are mainly Catskill.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Bone | 2 | 5 | 451 | 10 |
| Fire clay | 1 | 1 | 452 | 11 |
| Shale, soft, dark | 4 | 0 | 456 | 11 |
| Shale, sandy | 7 | 0 | 463 | 11 |
| Shale, tough, dark, to bottom | 10 | 0 | 473 | 11 |

## Davis Coal & Coke Company No. 42 Coal Test Boring (20).

Fairfax District; on Pendleton Creek, 1.4 miles east of Thomas; authority, Davis Coal & Coke Company; completed, May, 1910; elevation, 2990′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay, with gravel | 14 | 0 | 14 | 0 |
| Shale, black | 2 | 0 | 16 | 0 |
| Shale, black, and coal, Elk Lick | 0 | 6 | 16 | 6 |
| Shale, gray | 20 | 6 | 37 | 0 |
| Shale, mixed | 1 | 0 | 38 | 0 |
| Shale, gray | 2 | 0 | 40 | 0 |
| Shale, red | 3 | 0 | 43 | 0 |
| Shale, sandy | 7 | 0 | 50 | 0 |
| Sandstone, shaly....31′ 0″ | | | | |
| Shale, red.......... 5 0 | | | | |
| Sandstone, shaly.... 4 0 | | | | |
| Sandstone ......... 9 0 | | | | |
| Shale, sandy....... 9 0 | | | | |
| Grafton Sandstone (above five) | 58 | 0 | 108 | 0 |
| Shale, dark, Ames | 12 | 2 | 120 | 2 |
| Coal, Harlem | 1 | 7 | 121 | 9 |
| Shale, gray | 5 | 3 | 127 | 0 |
| Shale, gray, hard bands | 16 | 0 | 143 | 0 |
| Shale, gray | 7 | 0 | 150 | 0 |
| Sandstone, shaly | 5 | 0 | 155 | 0 |
| Sandstone, Jane Lew | 33 | 0 | 188 | 0 |
| Shale, gray | 3 | 0 | 191 | 0 |
| Shale, variegated | 1 | 0 | 192 | 0 |
| Shale, sandy | 13 | 0 | 205 | 0 |
| Shale, variegated | 16 | 0 | 221 | 0 |
| Sandstone, shaly, Saltsburg | 6 | 0 | 227 | 0 |
| Shale, variegated | 14 | 0 | 241 | 0 |
| Shale, gray | 28 | 0 | 269 | 0 |
| Sandstone | 9 | 0 | 278 | 0 |
| Shale, red, Meyersdale | 5 | 0 | 283 | 0 |
| Shale, sandy, Buffalo Sandstone | 34 | 0 | 317 | 0 |
| Shale, gray | 3 | 6 | 320 | 6 |
| Coal, Brush Creek | 0 | 11 | 321 | 5 |
| Shale, sandy | 16 | 7 | 338 | 0 |
| Sandstone | 1 | 0 | 339 | 0 |
| Shale, sandy | 4 | 0 | 343 | 0 |
| Shale, gray | 8 | 0 | 351 | 0 |
| Shale, mixed | 10 | 0 | 361 | 0 |
| Sandstone .........15′ 0″ | | | | |
| Sandstone, hard.... 4 0 | | | | |
| Sandstone .........16 0 | | | | |
| Lower Mahoning (above three) | 35 | 0 | 396 | 0 |
| Shale, sandy.......14′ 0″ | | | | |
| Shale, dark......... 1 3 | | | | |
| Uffington (above two) | 15 | 3 | 411 | 3 |

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Coal ........ 0′ 2″ / Slate ........ 0 10 / Coal ........ 2 1 / Slate ........ 0 2 / Coal ........ 3 2 } Upper Freeport (Davis) | 6 5 | 417 8 |
| Bone ........................................ | 0 2 | 417 10 |
| Shale, dark-gray, to bottom.................. | 1 8 | 419 6 |

## Davis Coal & Coke Company No. 26 Coal Test Boring (21).

Fairfax District; on Sand Run of North Fork of Blackwater River, 0.1 mile east of Pierce; authority, Davis Coal & Coke Company; completed, April, 1910; elevation, 3052′ L.

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Clay and boulders.......................... | 5 0 | 5 0 |
| Clay, yellow................................ | 11 0 | 16 0 |
| Shale, gray, **Ames**.......................... | 13 8 | 29 8 |
| **Coal, Harlem**................................ | 0 10 | 30 6 |
| Shale, soft, gray........................... | 4 6 | 35 0 |
| Shale, gray, with bands..................... | 12 0 | 47 0 |
| Shale, red.................................. | 3 0 | 50 0 |
| Shale, gray................................. | 20 0 | 70 0 |
| Sandstone, **Jane Lew**........................ | 28 0 | 98 0 |
| Shale, gray................................. | 16 0 | 114 0 |
| Sandstone .................................. | 6 0 | 120 0 |
| Shale, sandy................................ | 5 0 | 125 0 |
| Shale, gray................................. | 9 0 | 134 0 |
| Shale, blue................................. | 9 0 | 143 0 |
| Shale, with lime bands...................... | 8 0 | 151 0 |
| Sandstone, shale bands, **Saltsburg**.......... | 19 0 | 170 0 |
| Shale, sandy................................ | 3 0 | 173 0 |
| Shale, soft, gray........................... | 9 0 | 182 0 |
| Shale, soft, red, **Meyersdale**................ | 3 0 | 185 0 |
| Shale, gray................................. | 4 0 | 189 0 |
| Sandstone ........... 5′ 0″ / Shale, sandy.......... 3 0 / Sandstone ........... 3 0 } **Buffalo** ....... | 11 0 | 200 0 |
| Shale, mixed................................ | 12 0 | 212 0 |
| Shale, sandy................................ | 25 0 | 237 0 |
| Shale, gray................................. | 14 0 | 251 0 |
| Shale, mixed................................ | 8 0 | 259 0 |
| Sandstone, **Upper Mahoning**.................. | 5 0 | 264 0 |
| Shale, sandy................................ | 9 0 | 273 0 |
| Shale, red, **Mahoning**....................... | 4 0 | 277 0 |
| Shale, mixed................................ | 3 0 | 280 0 |
| Shale, sandy................................ | 9 0 | 289 0 |
| Sandstone .........21′ 0″ / Sandstone, coarse..13 0 } **Lower Mahoning**. | 34 0 | 323 0 |
| Shale, sandy................................ | 8 0 | 331 0 |
| Shale, dark, **Uffington**..................... | 8 5 | 339 5 |

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Coal ......... 0′ 2″ | | | |
| Slate ........ 0 1 | | | |
| Coal ......... 2 3 | Upper Freeport (Davis) | 5 9 | 345 2 |
| Slate ........ 0 2 | | | |
| Coal ......... 3 1 | | | |
| Fire clay, to bottom | | 1 10 | 347 0 |

## Davis Coal & Coke Company No. 25 Coal Test Boring (22).

Fairfax District; on Sand Run of North Fork of Blackwater River, 0.2 mile north of Pierce; authority, Davis Coal & Coke Company: completed, October 19, 1915; elevation, 3024′ L.

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Clay | | 3 0 | 3 0 |
| Sand | | 2 0 | 5 0 |
| Clay and gravel | | 8 0 | 13 0 |
| Sandstone | | 1 0 | 14 0 |
| Shale, gray | | 12 0 | 26 0 |
| Shale, gray, sandy | | 30 0 | 56 0 |
| Shale, blue, sticky | | 24 0 | 80 0 |
| Shale, mixed, red and gray | | 5 0 | 85 0 |
| Shale, sandy | | 11 0 | 96 0 |
| Shale, mixed | | 6 0 | 102 0 |
| Shale, gray | | 10 0 | 112 0 |
| Shale, sandy | | 8 0 | 120 0 |
| Shale, gray | | 12 0 | 132 0 |
| Shale, soft, sticky, mixed | | 20 0 | 152 0 |
| Shale, gray | | 13 0 | 165 0 |
| Sandstone, medium-hard, Upper Mahoning | | 10 0 | 175 0 |
| Shale, gray | | 1 0 | 176 0 |
| Sandstone ........... 1′ 0″ | | | |
| Shale, sandy, with sandstone bands.........25 0 | | | |
| Shale, gray, sandy..... 1 0 | Lower Mahoning ... | 38 0 | 214 9 |
| Sandstone, coarse..... 4 0 | | | |
| Shale, gray............ 3 0 | | | |
| Sandstone, coarse..... 4 0 | | | |
| Shale, gray | | 9 0 | 223 0 |
| Shale, dark, Uffington | | 12 8 | 235 8 |
| Coal ......... 0′ 2″ | | | |
| Bone ......... 0 2 | | | |
| Coal ......... 2 3 | Upper Freeport (Davis) | 6 1 | 241 9 |
| Bone ......... 0 3 | | | |
| Coal ......... 3 3 | | | |
| Bone | | 0 3 | 242 0 |
| Shale, dark-gray, to bottom | | 1 0 | 243 0 |

## Davis Coal & Coke Company No. 27 Coal Test Boring (26).

Fairfax District; on branch of Glade Run, 0.9 mile northeast of Pierce; authority, Davis Coal & Coke Company; completed, May, 1910; elevation, 3012′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 6 | 0 | 6 | 0 |
| Sandstone | 3 | 0 | 9 | 0 |
| Shale, soft, gray | 28 | 0 | 37 | 0 |
| Shale, mixed | 8 | 0 | 45 | 0 |
| Shale, gray | 5 | 0 | 50 | 0 |
| Shale, mixed | 5 | 0 | 55 | 0 |
| Shale, gray | 10 | 0 | 65 | 0 |
| Shale, mixed | 8 | 0 | 73 | 0 |
| Shale, red | 5 | 0 | 78 | 0 |
| Shale, sandy | 9 | 0 | 87 | 0 |
| Shale, gray | 13 | 0 | 100 | 0 |
| Shale, dark, **Ames** | 11 | 11 | 111 | 11 |
| **Coal, Harlem** | 1 | 1 | 113 | 0 |
| Shale, soft, gray | 15 | 0 | 128 | 0 |
| Shale, mixed | 5 | 0 | 133 | 0 |
| Shale, red | 5 | 0 | 138 | 0 |
| Shale, gray | 21 | 0 | 159 | 0 |
| Shale, blue | 6 | 0 | 165 | 0 |
| Shale, blue, sandy | 2 | 0 | 167 | 0 |
| Sandstone, coarse, **Saltsburg** | 23 | 0 | 190 | 0 |
| Shale, blue | 3 | 0 | 193 | 0 |
| Shale, dark | 5 | 0 | 198 | 0 |
| Shale, gray | 33 | 0 | 231 | 0 |
| Shale, mixed | 2 | 0 | 233 | 0 |
| Shale, tough, blue | 10 | 0 | 243 | 0 |
| Shale, blue, sandy | 15 | 0 | 258 | 0 |
| Shale, dark | 2 | 0 | 260 | 0 |
| Shale, sticky | 9 | 0 | 269 | 0 |
| Sandstone, shale bands...... 4′ 0″ } **Buffalo.** | 14 | 0 | 283 | 0 |
| Sandstone, hard.............10 0 | | | | |
| Shale, red and gray | 11 | 0 | 294 | 0 |
| Sandstone, hard | 5 | 0 | 299 | 0 |
| Shale, sandy | 2 | 0 | 301 | 0 |
| Shale, gray | 10 | 0 | 311 | 0 |
| Shale, dark, **Brush Creek** | 7 | 9 | 318 | 9 |
| **Coal, Brush Creek** | 0 | 10 | 319 | 7 |
| Shale, soft, gray | 5 | 5 | 325 | 0 |
| Sandstone, shale bands... 4′ 0″ } **Upper** | 66 | 0 | 391 | 0 |
| Sandstone ...............62 0 } **Mahoning** | | | | |
| Shale, sandy | 2 | 0 | 393 | 0 |
| Sandstone .............. 4′ 0″ } **Lower** | 6 | 0 | 399 | 0 |
| Sandstone, medium-hard.. 2 0 } **Mahoning** | | | | |
| Shale, sandy | 5 | 0 | 404 | 0 |
| Shale, gray, sandy | 6 | 0 | 410 | 0 |
| Shale, dark, **Uffington** | 9 | 4 | 419 | 4 |
| **Coal** ....... 0′ 2″ | | | | |
| Slate ...... 0 2 | | | | |
| **Coal** ....... 0 3 | | | | |
| Slate ...... 0 1 | | | | |
| **Coal** ....... 2 0 } **Upper Freeport (Davis)** | 7 | 9 | 427 | 1 |
| Slate ...... 0 1½ | | | | |
| **Coal** ....... 3 4½ | | | | |
| Slate ...... 0 9 | | | | |
| **Coal** ....... 0 10 | | | | |
| Shale, dark, to bottom | 1 | 11 | 429 | 0 |

## Davis Coal & Coke Company No. 44 Coal Test Boring (27).

Fairfax District; on North Branch of Potomac River, 1.2 miles southwest of Kempton; authority, Davis Coal & Coke Company; completed, March 13, 1913; elevation, 2980' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 21 | 0 | 21 | 0 |
| Shale, red | 15 | 0 | 36 | 0 |
| Shale, sandy | 11 | 0 | 47 | 0 |
| Shale, red | 5 | 0 | 52 | 0 |
| Shale, sandy | 40 | 0 | 92 | 0 |
| Fire clay, soft | 12 | 0 | 104 | 0 |
| Shale, sandy | 20 | 0 | 124 | 0 |
| Sandstone, Jane Lew | 25 | 0 | 149 | 0 |
| Shale, green, sandy | 33 | 0 | 182 | 0 |
| Shale, white, sandy | 18 | 0 | 200 | 0 |
| Fire clay, soft | 9 | 0 | 209 | 0 |
| Shale, hard, sandy | 24 | 0 | 233 | 0 |
| Slate, black, Bakerstown (Thomas) Coal horizon | 2 | 0 | 235 | 0 |
| Fire clay, soft | 6 | 0 | 241 | 0 |
| Shale, sandy | 49 | 0 | 290 | 0 |
| Sandstone, Buffalo | 20 | 0 | 310 | 0 |
| Shale, sandy | 19 | 0 | 329 | 0 |
| Slate, black | 1 | 4 | 330 | 4 |
| Fire clay, soft | 10 | 0 | 340 | 4 |
| Shale, hard, sandy | 20 | 0 | 360 | 4 |
| Fire clay, soft | 6 | 8 | 367 | 0 |
| Shale | 30 | 0 | 397 | 0 |
| Fire clay, soft | 12 | 0 | 409 | 0 |
| Shale, sandy..........20' 0" / Slate, black..........12 0 } Uffington | 32 | 0 | 441 | 0 |
| Fire clay, soft | 7 | 0 | 448 | 0 |
| Clay, black, Upper Freeport (Davis) Coal horizon | 11 | 0 | 459 | 0 |
| Shale, white | 22 | 0 | 481 | 0 |
| Sandstone, Upper Freeport | 12 | 0 | 493 | 0 |
| Shale, white | 18 | 0 | 511 | 0 |
| Sandstone, dark, Lower Freeport | 19 | 0 | 530 | 0 |
| Slate, black, Upper Kittanning Coal horizon | 0 | 3 | 530 | 3 |
| Fire clay | 3 | 9 | 534 | 0 |
| Shale, dark, to bottom | 26 | 0 | 560 | 0 |

## Davis Coal & Coke Company No. 40 Coal Test Boring (28).

Fairfax District; on North Branch of Potomac River, 1.1 miles southwest of Kempton; authority, Davis Coal & Coke Company; completed, April 16, 1913; elevation, 2853' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and clay | 2 | 0 | 2 | 0 |
| Sandstone | 3 | 0 | 5 | 0 |
| Sand and gravel | 3 | 0 | 8 | 0 |
| Shale, soft, gray | 2 | 0 | 10 | 0 |

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Shale, sandy | 2 | 0 | 12 | 0 |
| Shale, gray | 27 | 0 | 39 | 0 |
| Sandstone, Buffalo | 19 | 0 | 58 | 0 |
| Shale, gray | 9 | 0 | 67 | 0 |
| Shale, blue, Brush Creek Coal horizon | 4 | 0 | 71 | 0 |
| Shale, sandy | 18 | 0 | 89 | 0 |
| Shale, soft, gray | 9 | 0 | 98 | 0 |
| Shale, sandy | 14 | 0 | 112 | 0 |
| Sandstone, hard, crystalline ....10′ 0″; Sandstone, hard. 4 0 } Upper Mahoning | 14 | 0 | 126 | 0 |
| Shale, soft, muddy | 36 | 0 | 162 | 0 |
| Shale, gray, with sandstone bands | 19 | 0 | 181 | 0 |
| Shale, dark, Uffington | 9 | 6 | 190 | 6 |
| Coal ......... 0′ 4″; Shale, dark... 0 4; Coal ......... 1 4; Binder ...... 0 8; Coal ......... 2 6 } Upper Freeport (Davis) | 5 | 2 | 195 | 8 |
| Fire clay | 2 | 4 | 198 | 0 |
| Slate | 0 | 6 | 198 | 6 |
| Fire clay | 8 | 6 | 207 | 0 |
| Shale, gray | 1 | 0 | 208 | 0 |
| Coal | 0 | 3 | 208 | 3 |
| Shale, soft, muddy | 43 | 9 | 252 | 0 |
| Shale, gray | 19 | 0 | 271 | 0 |
| Shale, gray, with sandstone bands | 15 | 0 | 286 | 0 |
| Shale, sandy | 6 | 0 | 292 | 0 |
| Sandstone, hard, Kittanning, to bottom | 5 | 0 | 297 | 0 |

## Davis Coal & Coke Company No. 41 Coal Test Boring (29).

Fairfax District; on North Branch of Potomac River, 1.3 miles southwest of Kempton; authority, Davis Coal & Coke Company; elevation, 2943′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and gravel | 20 | 0 | 20 | 0 |
| Slate, black, Bakerstown (Thomas) Coal horizon | 1 | 0 | 21 | 0 |
| Fire clay | 5 | 0 | 26 | 0 |
| Shale, mud | 10 | 0 | 36 | 0 |
| Shale, broken, gray | 34 | 0 | 70 | 0 |
| Sandstone .......... 5′ 0″; Conglomerate, hard....10 0; Sandstone, hard....... 5 0 } Buffalo | 20 | 0 | 90 | 0 |
| Shale, blue | 10 | 0 | 100 | 0 |
| Slate, black, Brush Creek | 8 | 0 | 108 | 0 |
| Coal, Brush Creek | 1 | 0 | 109 | 0 |
| Shale, gray | 4 | 0 | 113 | 0 |
| Shale, soft, gray | 7 | 0 | 120 | 0 |
| Shale, sandy | 10 | 0 | 130 | 0 |
| Shale, gray | 6 | 0 | 136 | 0 |
| Sandstone, hard, Upper Mahoning | 27 | 0 | 163 | 0 |
| Shale, broken, gray | 5 | 0 | 168 | 0 |

| | | | | |
|---|---|---|---|---|
| Shale, soft, gray | 10 | 0 | 178 | 0 |
| Shale, gray | 10 | 0 | 188 | 0 |
| Shale, sandy | 22 | 0 | 210 | 0 |
| Shale, dark | 1 | 0 | 211 | 0 |
| Coal | 1 | 0 | 212 | 0 |
| Shale, dark, sandy | 6 | 0 | 218 | 0 |
| Slate, black | 3 | 0 | 221 | 0 |
| Coal ........ 1' 10" | | | | |
| Slate binder. 0 9 | | | | |
| Coal ........ 3 1 | | | | |
| Slate ....... 0 4 Upper Freeport (Davis) | 8 | 0 | 229 | 0 |
| Fire clay.... 0 8 | | | | |
| Bone coal.... 0 4 | | | | |
| Coal ........ 1 0 | | | | |
| Fire clay | 5 | 0 | 234 | 0 |
| Fire clay, broken, to bottom | 10 | 0 | 244 | 0 |

## Davis Coal & Coke Company No. 39 Coal Test Boring (30).

Fairfax District; on branch of North Fork of Potomac River, 1.1 miles northwest of Fairfax Stone; authority, Davis Coal & Coke Company; completed, March 12, 1913; elevation, 2868' L.

| | Thickness. | | Total. | |
|---|---|---|---|---|
| | Ft. | In. | Ft. | In. |
| Gravel and boulders | 5 | 0 | 5 | 0 |
| Sand and gravel | 13 | 0 | 18 | 0 |
| Clay, hard and yellow | 2 | 0 | 20 | 0 |
| Shale, soft, gray | 21 | 0 | 41 | 0 |
| Bone coal....... 3' 0" Upper Freeport | | | | |
| Shale, soft, dark. 4 0 (Davis) | 9 | 0 | 50 | 0 |
| Coal ........... 2 0 | | | | |
| Shale, gray | 7 | 0 | 57 | 0 |
| Shale, soft mud | 33 | 0 | 90 | 0 |
| Shale, sandy | 5 | 0 | 95 | 0 |
| Sandstone, hard | 4 | 0 | 99 | 0 |
| Shale, soft, gray | 16 | 0 | 115 | 0 |
| Slate, black, with coal partings, Upper Kittanning | 3 | 0 | 118 | 0 |
| Shale, soft, gray | 2 | 0 | 120 | 0 |
| Shale, sandy | 19 | 0 | 139 | 0 |
| Shale, hard, limy | 11 | 0 | 150 | 0 |
| Sandstone, crystalline, hard ...............33' 0" Kittanning | 35 | 0 | 185 | 0 |
| Sandstone ............ 2 0 | | | | |
| Coal, Clarion | 0 | 9 | 185 | 9 |
| Slate, gray | 5 | 3 | 191 | 0 |
| Sandstone, hard..........29' 0" Homewood | 66 | 0 | 257 | 0 |
| Sandstone, broken, black.37 0 | | | | |
| Slate, black, with coal | 5 | 0 | 262 | 0 |
| Fire clay, to bottom | 5 | 0 | 267 | 0 |

## Davis Coal & Coke Company No. 38 Coal Test Boring (31).

Preston County; on a branch of North Branch of Potomac River, 1.54 miles northwest of Fairfax Stone; authority, Davis Coal & Coke

Company; completed, December 7, 1911; elevation, 2922' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 6 | 0 | 6 | 0 |
| Sandstone, coarse 8' 0" / Sandstone, with pebbles 3 0 } Buffalo | 11 | 0 | 17 | 0 |
| Shale, sticky | 10 | 0 | 27 | 0 |
| Shale, with sand bands | 6 | 0 | 33 | 0 |
| Shale, gray | 9 | 0 | 42 | 0 |
| Shale, dark, Brush Creek | 10 | 1 | 52 | 1 |
| Coal, bony, Brush Creek | 0 | 11 | 53 | 0 |
| Shale, gray | 11 | 0 | 64 | 0 |
| Sandstone | 2 | 0 | 66 | 0 |
| Shale, gray | 4 | 0 | 70 | 0 |
| Shale, soft, sticky, gray | 10 | 0 | 80 | 0 |
| Shale, gray | 29 | 0 | 109 | 0 |
| Sandstone, hard, Lower Mahoning | 36 | 0 | 145 | 0 |
| Shale, dark-gray | 5 | 0 | 150 | 0 |
| Shale, dark | 5 | 4 | 155 | 4 |
| Slate, black | 0 | 8 | 156 | 0 |
| Coal 1' 1" / Slate, black 4 0 / Bone coal 0 1 / Coal 2 1 / Slate binder, gray 0 2 / Coal 3 2 / Slate, gray 1 10 / Coal 3 3 } Upper Freeport (Davis) | 15 | 8 | 171 | 8 |
| Shale, sticky, gray, to bottom | 4 | 4 | 176 | 0 |

## Davis Coal & Coke Company No. 43 Coal Test Boring (32).

Preston County; on North Branch of Potomac River, 0.8 mile west of Kempton; authority, Davis Coal & Coke Company; completed February 11, 1913; elevation, 2783' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and boulders | 15 | 0 | 15 | 0 |
| Sandstone, hard, Buffalo | 41 | 0 | 56 | 0 |
| Shale, sandy | 25 | 0 | 81 | 0 |
| Slate, black, Brush Creek | 4 | 0 | 85 | 0 |
| Coal, Brush Creek | 0 | 4 | 85 | 4 |
| Fire clay, soft | 6 | 0 | 91 | 4 |
| Shale, sandy | 14 | 8 | 106 | 0 |
| Limestone, Sutton | 2 | 0 | 108 | 0 |
| Sandstone 12' 0" / Sandstone, medium-hard 20 0 / Sandstone, very hard 22 0 } Lower Mahoning | 54 | 0 | 162 | 0 |
| Shale, sandy | 22 | 0 | 184 | 0 |
| Coal 0' 10" / Shale 7 2 / Coal 0 6 / Slate 0 2 / Coal 2 10 / Slate 3 0 / Coal 3 8 } Upper Freeport (Davis) | 18 | 2 | 202 | 2 |
| Shale, sandy, to bottom | 13 | 0 | 215 | 2 |

## Davis Coal & Coke Company No. 45 Coal Test Boring (33).

Garrett County, Maryland; on North Branch of Potomac River, 0.4 west of Kempton; authority, Davis Coal & Coke Company; completed, January 6, 1912; elevation, 2727′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 6 | 0 | 6 | 0 |
| Shale, soft | 3 | 0 | 9 | 0 |
| Shale, sandy | 12 | 0 | 21 | 0 |
| Shale, blue, sandy | 22 | 0 | 43 | 0 |
| Shale, soft, dark | 4 | 0 | 47 | 0 |
| Limestone, Ewing | 6 | 0 | 53 | 0 |
| Shale, red | 2 | 0 | 55 | 0 |
| Shale, blue, sandy | 25 | 0 | 80 | 0 |
| Sandstone, Saltsburg | 12 | 0 | 92 | 0 |
| Shale, dark, Bakerstown (Thomas) Coal horizon | 8 | 0 | 100 | 0 |
| Shale, gray, with limestone, Albright | 4 | 0 | 104 | 0 |
| Shale, blue | 43 | 0 | 147 | 0 |
| Sandstone, Buffalo | 9 | 0 | 156 | 0 |
| Shale, red | 7 | 0 | 163 | 0 |
| Shale, blue | 17 | 0 | 180 | 0 |
| Shale, dark, Brush Creek | 11 | 4 | 191 | 4 |
| Bone coal, Brush Creek | 1 | 8 | 193 | 0 |
| Shale, gray | 7 | 0 | 200 | 0 |
| Sandstone ......... 4′ 0″ | | | | |
| Shale, gray, sandy..24 0 — Upper Mahoning | 37 | 0 | 237 | 0 |
| Sandstone ......... 9 0 | | | | |
| Shale, blue | 7 | 0 | 244 | 0 |
| Shale, gray, mixed with lime | 22 | 0 | 266 | 0 |
| Sandstone, hard. 2′ 0″ — Lower Mahoning | 12 | 0 | 278 | 0 |
| Sandstone ......10 0 | | | | |
| Shale, gray, sandy | 11 | 0 | 289 | 0 |
| Shale, dark... 4′ 0″ | | | | |
| Shale, gray... 4 0 — Uffington | 11 | 0 | 300 | 0 |
| Shale, dark... 3 0 | | | | |
| Shale, dark, with coal partings | 1 | 9 | 301 | 9 |
| Coal ...... 1′ 2″ | | | | |
| Shale, dark 4 11 | | | | |
| Coal ...... 2 7½ | | | | |
| Slate binder 0 2½ — Upper Freeport (Davis) | 17 | 10 | 319 | 7 |
| Coal ...... 3 1 | | | | |
| Slate binder 1 3 | | | | |
| Coal ...... 4 7 | | | | |
| Shale, gray, to bottom | 5 | 0 | 324 | 7 |

## Davis Coal & Coke Company No. 46 Coal Test Boring (34).

Garrett County, Maryland; on North Branch of Potomac River, 0.5 mile northward from Kempton; authority, Davis Coal & Coke Company; completed, January 21, 1913; elevation, 2947′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and gravel | 28 | 0 | 28 | 0 |

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Shale, broken, with slate | 27 | 0 | 55 | 0 |
| Slate, black | 8 | 0 | 63 | 0 |
| Shale, red | 11 | 0 | 74 | 0 |
| Shale, blue | 31 | 0 | 105 | 0 |
| Shale, red | 2 | 0 | 107 | 0 |
| Shale, blue | 16 | 0 | 123 | 0 |
| Shale, gray | 20 | 0 | 143 | 0 |
| Shale, dark | 13 | 0 | 156 | 0 |
| Shale, gray | 41 | 0 | 197 | 0 |
| Shale, red | 12 | 0 | 209 | 0 |
| Sandstone | 10 | 0 | 219 | 0 |
| Shale, red | 4 | 0 | 223 | 0 |
| Sandstone, **Grafton** | 16 | 0 | 239 | 0 |
| Shale, gray | 10 | 0 | 249 | 0 |
| Shale, dark, **Ames** | 9 | 0 | 258 | 0 |
| Bone **coal, Harlem** | 0 | 8 | 258 | 8 |
| Shale, black | 0 | 4 | 259 | 0 |
| Shale, gray, muddy | 18 | 0 | 277 | 0 |
| Shale, red | 7 | 0 | 284 | 0 |
| Shale, gray | 5 | 0 | 289 | 0 |
| Shale, red | 9 | 0 | 298 | 0 |
| Shale, blue | 33 | 6 | 331 | 6 |
| Slate, black | 1 | 6 | 333 | 0 |
| **Coal** | 0 | 2 | 333 | 2 |
| Shale, blue | 21 | 10 | 355 | 0 |
| Sandstone, **Jane Lew** | 25 | 0 | 380 | 0 |
| Slate, black | 9 | 0 | 389 | 0 |
| Shale, soft, gray | 10 | 0 | 399 | 0 |
| Shale, sandy | 10 | 0 | 409 | 0 |
| Shale, soft | 9 | 0 | 418 | 0 |
| Shale, soft, gray | 10 | 0 | 428 | 0 |
| Sandstone, **Saltsburg** | 5 | 0 | 433 | 0 |
| Shale, gray | 10 | 0 | 443 | 0 |
| Shale, muddy | 6 | 0 | 449 | 0 |
| Shale, gray | 3 | 0 | 452 | 0 |
| Shale, muddy | 6 | 0 | 458 | 0 |
| Shale, gray | 13 | 0 | 471 | 0 |
| Slate, gray | 2 | 0 | 473 | 0 |
| Slate, black, **Brush Creek** | 14 | 0 | 487 | 0 |
| **Coal, Brush Creek** | 1 | 6 | 488 | 6 |
| Shale, muddy | 20 | 6 | 509 | 0 |
| Soapstone | 3 | 0 | 512 | 0 |
| Shale, limy | 10 | 0 | 522 | 0 |
| Shale, blue | 10 | 0 | 532 | 0 |
| Shale, spotted | 9 | 0 | 541 | 0 |
| Shale, blue | 14 | 0 | 555 | 0 |
| Sandstone, hard, **Upper Mahoning** | 13 | 0 | 568 | 0 |
| Shale, dark | 3 | 0 | 571 | 0 |
| Sandstone, **Lower Mahoning** | 4 | 0 | 575 | 0 |
| Shale, broken | 4 | 0 | 579 | 0 |
| Shale, gray | 12 | 10 | 591 | 10 |
| **Coal** 0′ 11″; Binder 0 1; **Coal** 4 4; Slate 1 6; **Coal** 2 1½ } **Upper Freeport (Davis)** | 8 | 11½ | 600 | 9½ |
| Shale, gray, sticky, to bottom | 6 | 9½ | 607 | 7 |

## Davis Coal & Coke Company No. 59 Coal Test Boring (35).

Garrett County, Maryland; on a branch of North Branch of Potomac River, 0.5 mile northeast of Kempton; authority, Davis Coal & Coke Company; completed, December 6, 1912; elevation, 2710' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 17 | 0 | 17 | 0 |
| Sandstone, Morgantown | 46 | 0 | 63 | 0 |
| Shale, lime | 15 | 0 | 78 | 0 |
| Slate, gray | 11 | 0 | 89 | 0 |
| Slate, blue | 8 | 0 | 97 | 0 |
| Coal, Elk Lick (Barton) ? | 1 | 0 | 98 | 0 |
| Shale, hard, blue | 10 | 0 | 108 | 0 |
| Shale, broken lime | 20 | 0 | 128 | 0 |
| Shale, sand | 5 | 0 | 133 | 0 |
| Limestone | 20 | 0 | 153 | 0 |
| Shale, broken | 15 | 0 | 168 | 0 |
| Shale, black | 2 | 0 | 170 | 0 |
| Shale, gray | 3 | 0 | 173 | 0 |
| Bone coal, Harlem | 1 | 0 | 174 | 0 |
| Pittsburgh Reds: Shale, broken 6' 0"; Shale, lime 69 0; Shale, red 3 0; Shale, gray 11 0; Shale, red 3 0 | 92 | 0 | 266 | 0 |
| Shale, gray | 34 | 0 | 300 | 0 |
| Shale, black | 5 | 0 | 305 | 0 |
| Slate, black | 0 | 2 | 305 | 2 |
| Coal, Bakerstown (Thomas) | 0 | 10 | 306 | 0 |
| Shale, sandy | 8 | 0 | 314 | 0 |
| Shale, blue | 9 | 0 | 323 | 0 |
| Shale, gray | 7 | 0 | 330 | 0 |
| Shale, blue | 28 | 0 | 358 | 0 |
| Buffalo: Sandstone, coarse 9' 0"; Lime rock, hard 6 0; Sandstone, very hard 11 0; Sandstone, hard 13 0 | 39 | 0 | 397 | 0 |
| Shale, dark, Brush Creek | 5 | 0 | 402 | 0 |
| Slate, gray | 9 | 0 | 411 | 0 |
| Slate, black, Brush Creek Coal horizon | 1 | 0 | 412 | 0 |
| Fire clay | 1 | 0 | 413 | 0 |
| Shale, gray | 28 | 0 | 441 | 0 |
| Shale, colored | 17 | 0 | 458 | 0 |
| Shale, gray | 24 | 0 | 482 | 0 |
| Coal, Upper Freeport (Davis) | 2 | 0 | 484 | 0 |
| Shale, muddy | 19 | 0 | 503 | 0 |
| Shale, soft, dark, to bottom | 15 | 0 | 518 | 0 |

## Davis Coal & Coke Company No. 60 Coal Test Boring (36).

Garrett County, Maryland; on North Branch of Potomac River, 0.6 mile northeast of Kempton; authority, Davis Coal & Coke Company, elevation, 2707' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay, yellow | 20 | 0 | 20 | 0 |
| Fire clay, soft | 15 | 0 | 35 | 0 |
| Shale, gray, sandy | 30 | 0 | 65 | 0 |
| Fire clay, soft | 3 | 0 | 68 | 0 |
| Shale, gray, sandy | 27 | 0 | 95 | 0 |
| Slate, black, **Harlem Coal horizon** | 15 | 0 | 110 | 0 |
| Fire clay, soft | 5 | 6 | 115 | 6 |
| Shale, gray | 20 | 0 | 135 | 6 |
| Shale, red | 10 | 6 | 146 | 0 |
| Limestone | 14 | 0 | 160 | 0 |
| Shale, gray | 3 | 0 | 163 | 0 |
| Limestone | 17 | 0 | 180 | 0 |
| Shale, sandy | 16 | 0 | 196 | 0 |
| Sandstone, **Saltsburg** | 46 | 0 | 242 | 0 |
| Slate | 5 | 0 | 247 | 0 |
| **Coal, Bakerstown (Thomas)** | 0 | 2 | 247 | 2 |
| Slate | 5 | 6 | 252 | 8 |
| Sandstone, **Buffalo** | 20 | 10 | 273 | 6 |
| Shale, sandy | 23 | 6 | 297 | 0 |
| Shale, red | 10 | 0 | 307 | 0 |
| Shale, sandy | 9 | 0 | 316 | 0 |
| Slate, black | 11 | 0 | 327 | 0 |
| Limestone | 4 | 0 | 331 | 0 |
| Shale, soft | 20 | 0 | 351 | 0 |
| Fire clay | 7 | 0 | 358 | 0 |
| Shale, sandy | 24 | 0 | 382 | 0 |
| Sandstone ......12′ 0″; Clay, soft ...... 2 0; Sandstone ......23 0 } **Lower Mahoning** | 37 | 0 | 419 | 0 |
| Slate, black, **Upper Freeport (Davis) Coal horizon** | 7 | 0 | 426 | 0 |
| Slate | 6 | 0 | 432 | 0 |
| Shale, sandy | 11 | 0 | 443 | 0 |
| Clay, hard, **Bolivar** | 3 | 0 | 446 | 0 |
| Shale, sandy, to bottom | 41 | 0 | 487 | 0 |

## Davis Coal & Coke Company No. 61 Coal Test Boring (37).

Garrett County, Maryland; on North Branch of Potomac River, 0.9 mile northeast of Kempton; authority, Davis Coal & Coke Company; completed, January 7, 1913; elevation, 2699′ L.

| | Thickness. Ft. | In. | Total Ft. | In. |
|---|---|---|---|---|
| Sand and gravel | 42 | 0 | 42 | 0 |
| Shale, gray | 19 | 0 | 61 | 0 |
| Sandstone ......20′ 0″; Shale, gray ...... 5 0; Sandstone, hard ...... 4 0 } **Grafton** | 29 | 0 | 90 | 0 |
| Shale, gray | 25 | 0 | 115 | 0 |
| **Coal, Harlem** | 0 | 8 | 115 | 8 |
| Slate, dark ...... 5′ 4″; Shale, soft, muddy ..20 0; Shale, blue ...... 7 0; Shale, red ...... 5 0; Shale, blue ......10 0 } **Pittsburgh Reds** | 47 | 4 | 163 | 0 |

| | | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|---|
| Sandstone, Jane Lew | | | 19 | 0 | 182 | 0 |
| Shale, blue | 6′ 0″ | | | | | |
| Slate, red | 2 0 | | | | | |
| Shale, blue | 6 0 | | | | | |
| Shale, red | 5 0 | | | | | |
| Shale, gray | 22 0 | Pittsburgh Reds. | 67 | 0 | 249 | 0 |
| Shale, blue | 2 0 | | | | | |
| Shale, red | 2 0 | | | | | |
| Shale, blue | 22 0 | | | | | |
| Sandstone, Saltsburg | | | 15 | 0 | 264 | 0 |
| Shale, blue | | | 2 | 0 | 266 | 0 |
| Shale, red | | | 12 | 0 | 278 | 0 |
| Shale, sandy | | | 2 | 0 | 280 | 0 |
| Limestone shale | | | 18 | 0 | 298 | 0 |
| Shale, blue | | | 20 | 0 | 318 | 0 |
| Shale, dark, Brush Creek | | | 8 | 0 | 326 | 0 |
| Slate, black, Brush Creek Coal horizon | | | 16 | 0 | 342 | 0 |
| Shale, gray | | | 5 | 0 | 347 | 0 |
| Shale, sandy | | | 9 | 0 | 356 | 0 |
| Sandstone, Upper Mahoning | | | 27 | 0 | 383 | 0 |
| Slate, Mahoning Coal horizon | | | 3 | 0 | 386 | 0 |
| Sandstone, Lower Mahoning | | | 30 | 0 | 416 | 0 |
| Slate, black | 9′ 0″ | | | | | |
| Shale, dark | 20 0 | Uffington | 35 | 0 | 451 | 0 |
| Shale, gray | 6 0 | | | | | |
| Slate, black, Upper Freeport (Davis) Coal horizon | | | 10 | 0 | 461 | 0 |
| Slate, gray | | | 19 | 0 | 480 | 0 |
| Shale, soft | | | 21 | 0 | 501 | 0 |
| Shale, dark | | | 18 | 0 | 519 | 0 |
| Shale, gray | | | 14 | 0 | 533 | 0 |
| Shale, dark, Upper Kittanning Coal horizon, to bottom | | | 7 | 0 | 540 | 0 |

## Davis Coal & Coke Company No. 47 Coal Test Boring (38).

Garrett County, Maryland; on North Branch of Potomac River, at Kempton shaft; authority, Davis Coal & Coke Company; completed, December 19, 1911; elevation, 2712′ L.

| | | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|---|
| Clay and boulders | | | 17 | 8 | 17 | 8 |
| Sandstone, coarse, brown | 3′ 4″ | | | | | |
| Sandstone, shaly | 10 0 | Grafton | 18 | 4 | 36 | 0 |
| Sandstone | 1 6 | | | | | |
| Sandstone, shaly | 3 6 | | | | | |
| Shale, gray | | | 16 | 0 | 52 | 0 |
| Shale, dark, Ames | | | 11 | 10 | 63 | 10 |
| Bony coal, Harlem | | | 1 | 4 | 65 | 2 |
| Shale, gray, sticky | | | 16 | 10 | 82 | 0 |
| Shale, red and gray | | | 4 | 0 | 86 | 0 |
| Shale, gray, sticky | | | 12 | 0 | 98 | 0 |
| Shale, limestone | | | 2 | 0 | 100 | 0 |
| Shale, gray | | | 5 | 0 | 105 | 0 |
| Shale, red | | | 7 | 0 | 112 | 0 |

| | Thickness. | | Total. | |
|---|---|---|---|---|
| | Ft. | In. | Ft. | In. |
| Shale, gray | 4 | 0 | 116 | 0 |
| Shale, blue | 11 | 0 | 127 | 0 |
| Shale, blue, sandy | 14 | 0 | 141 | 0 |
| Limestone | 9 | 0 | 150 | 0 |
| Shale, dark-gray | 4 | 0 | 154 | 0 |
| Sandstone, blue, **Saltsburg** | 6 | 0 | 160 | 0 |
| Shale, gray | 15 | 0 | 175 | 0 |
| Shale, dark, **Bakerstown (Thomas) Coal horizon** | 17 | 0 | 192 | 0 |
| Limestone, **Albright** | 1 | 6 | 193 | 6 |
| Shale, blue, sandy | 14 | 6 | 208 | 0 |
| Shale, blue, sandy, with limestone, **Pine Creek** | 5 | 0 | 213 | 0 |
| Shale, black | 0 | 8 | 213 | 8 |
| Shale, sticky, gray | 3 | 4 | 217 | 0 |
| Shale, blue | 20 | 0 | 237 | 0 |
| Sandstone, **Buffalo** | 12 | 0 | 249 | 0 |
| Shale, gray | 4 | 0 | 253 | 0 |
| Shale, blue, sandy | 16 | 0 | 269 | 0 |
| Shale, black, **Brush Creek** | 12 | 2 | 281 | 2 |
| **Coal, Brush Creek** | 1 | 2 | 282 | 4 |
| Fire clay, dark | 0 | 8 | 283 | 0 |
| Shale, dark, soft, gray | 8 | 0 | 291 | 0 |
| Shale, blue, sandy | 18 | 0 | 309 | 0 |
| Sandstone, hard, **Upper Mahoning** | 19 | 0 | 328 | 0 |
| Shale, gray | 6 | 0 | 334 | 0 |
| Shale, blue, sandy | 7 | 0 | 341 | 0 |
| Sandstone, coarse ... 19′ 0″ | | | | |
| Sandstone, very hard ... 3 0 | | | | |
| Sandstone, fine-grained, hard 16 0 — **Lower Mahoning** | 50 | 0 | 391 | 0 |
| Sandstone, hard ... 8 0 | | | | |
| Sandstone, shaly ... 4 0 | | | | |
| Shale, gray | 5 | 0 | 396 | 0 |
| Shale, sandy | 2 | 0 | 398 | 0 |
| Sandstone, fine-grained | 2 | 2 | 400 | 2 |
| **Coal** ... 1′ 4″ | | | | |
| Binder ... 0 1 | | | | |
| **Coal** ... 3 1 | | | | |
| Slate, dark ... 1 10 — **Upper Freeport (Davis)** | 9 | 10 | 410 | 0 |
| **Coal** ... 1 5 | | | | |
| Binder ... 0 1 | | | | |
| **Coal** ... 2 0 | | | | |
| Shale, gray, to bottom | 6 | 0 | 416 | 0 |

## Davis Coal & Coke Company No. 48 Coal Test Boring (39).

Grant County; on short branch of North Branch of Potomac River, 0.6 mile south of Kempton; authority, Davis Coal & Coke Company; elevation, 2966′ L.

| | Thickness. | | Total. | |
|---|---|---|---|---|
| | Ft. | In. | Ft. | In. |
| Sand and gravel | 23 | 0 | 23 | 0 |
| Shale, broken, gray | 23 | 0 | 46 | 0 |
| Shale, broken, red | 10 | 0 | 56 | 0 |
| Shale, blue | 43 | 0 | 99 | 0 |

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Shale, gray | 2 | 0 | 101 | 0 |
| Shale, red | 4 | 0 | 105 | 0 |
| Shale, hard, gray | 28 | 0 | 133 | 0 |
| Shale, blue | 23 | 0 | 156 | 0 |
| Shale, muddy | 10 | 0 | 166 | 0 |
| Shale, dark | 10 | 0 | 176 | 0 |
| Slate, black | 3 | 6 | 179 | 6 |
| **Coal, Elk Lick (Barton)** | 0 | 4 | 179 | 10 |
| Slate, dark | 3 | 2 | 183 | 0 |
| Shale, gray | 32 | 0 | 215 | 0 |
| Shale, blue | 10 | 0 | 225 | 0 |
| Shale, red | 3 | 0 | 228 | 0 |
| Shale, mud | 22 | 0 | 250 | 0 |
| Sandstone, **Grafton** | 4 | 0 | 254 | 0 |
| Shale, gray | 10 | 0 | 264 | 0 |
| Slate, black, **Ames** | 17 | 0 | 281 | 0 |
| **Coal, Harlem** | 1 | 6 | 282 | 6 |
| Slate, black 2′ 6″; Shale, gray 8 0; Shale, broken, gray 20 0; Shale, red 5 0; Shale, sandy 9 0; Shale, gray 29 0; Shale, red 8 0 — **Pittsburgh Reds** | 81 | 6 | 364 | 0 |
| Shale, gray | 22 | 0 | 386 | 0 |
| Sandstone, **Saltsburg** | 10 | 0 | 396 | 0 |
| Shale, gray, horizon of **Bakerstown (Thomas) Coal** | 27 | 0 | 423 | 0 |
| Shale, broken | 24 | 0 | 447 | 0 |
| Sandstone, **Buffalo** | 7 | 0 | 454 | 0 |
| Shale, gray | 17 | 0 | 471 | 0 |
| Shale, sandy | 10 | 0 | 481 | 0 |
| Slate, black, **Brush Creek** | 13 | 0 | 494 | 0 |
| **Coal, Brush Creek** | 1 | 8 | 495 | 8 |
| Slate, dark | 2 | 4 | 498 | 0 |
| Shale, gray | 9 | 0 | 507 | 0 |
| Sandstone, **Upper Mahoning** | 20 | 0 | 527 | 0 |
| Shale, gray | 20 | 0 | 547 | 0 |
| Shale, sandy | 25 | 0 | 572 | 0 |
| Sandstone, very hard, **Lower Mahoning** | 8 | 0 | 580 | 0 |
| Shale, gray 9′ 0″; Slate, dark 3 0; **Coal** 0 6; Slate, black 1 6; Slate, dark 12 6½ — **Uffington** | 26 | 6½ | 606 | 6½ |
| **Coal** 2′ 1″; **Binder** 0 1½; **Coal** 3 1; **Slate** 2 9; **Coal** 4 4½; **Slate** 2 0½; **Coal** 0 6 — **Upper Freeport (Davis)** | 14 | 11½ | 621 | 6 |
| Slate, gray, to bottom | 7 | 11½ | 629 | 5½ |

## Davis Coal & Coke Company No. 49 Coal Test Boring (40).

Grant County; on branch of North Branch of Potomac River, 0.2 mile northwest of Fairfax; authority, Davis Coal & Coke Company; completed, March 11, 1913; elevation, 2967' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 6 | 0 | 6 | 0 |
| Gravel and boulders | 20 | 0 | 26 | 0 |
| Shale, blue | 5 | 0 | 31 | 0 |
| Shale, mud | 14 | 0 | 45 | 0 |
| Shale, red | 10 | 0 | 55 | 0 |
| Shale, gray | 42 | 0 | 97 | 0 |
| Shale, red | 12 | 0 | 109 | 0 |
| Shale, gray | 34 | 0 | 143 | 0 |
| Shale, red | 3 | 0 | 146 | 0 |
| Shale, gray | 13 | 0 | 159 | 0 |
| Shale, red | 10 | 0 | 169 | 0 |
| Shale, gray, broken | 10 | 0 | 179 | 0 |
| Shale, dark | 8 | 0 | 187 | 0 |
| Shale, gray | 49 | 0 | 236 | 0 |
| Shale, red | 19 | 0 | 255 | 0 |
| Shale, gray | 30 | 0 | 285 | 0 |
| Slate, dark, **Ames** | 2 | 6 | 287 | 6 |
| **Coal, Harlem** | 1 | 6 | 289 | 0 |
| Shale, gray | 25 | 0 | 314 | 0 |
| Shale, sandy | 9 | 0 | 323 | 0 |
| Shale, blue | 20 | 0 | 343 | 0 |
| Sandstone, **Jane Lew** | 9 | 0 | 352 | 0 |
| Shale, gray | 15 | 0 | 367 | 0 |
| Shale, red | 3 | 0 | 370 | 0 |
| Shale, gray, muddy | 11 | 0 | 381 | 0 |
| Shale, gray | 10 | 0 | 391 | 0 |
| Sandstone, **Saltsburg** | 6 | 0 | 397 | 0 |
| Shale, dark, **Bakerstown (Thomas) Coal horizon** | 10 | 0 | 407 | 0 |
| Shale, soft, gray | 53 | 0 | 460 | 0 |
| Shale, red | 10 | 0 | 470 | 0 |
| Shale, sandy | 17 | 0 | 487 | 0 |
| Slate, dark, **Brush Creek** | 14 | 0 | 501 | 0 |
| **Coal, Brush Creek** | 1 | 0 | 502 | 0 |
| Shale, gray | 24 | 0 | 526 | 0 |
| Shale, blue | 10 | 0 | 536 | 0 |
| Shale, gray | 26 | 0 | 562 | 0 |
| Sandstone, **Upper Mahoning** | 17 | 0 | 579 | 0 |
| Shale, soft, gray | 10 | 0 | 589 | 0 |
| Slate, black | 1 | 0 | 590 | 0 |
| Bone coal, **Mahoning** | 0 | 6 | 590 | 6 |
| Slate, black | 1 | 6 | 592 | 0 |
| Sandstone, dark, **Lower Mahoning** | 25 | 0 | 617 | 0 |
| Slate, **Uffington** | 3 | 6½ | 620 | 6½ |
| **Coal** ........ 0' 8" / Slate ....... 1 9 / **Coal** ........ 4 11 } **Upper Freeport (Davis)** | 7 | 4 | 627 | 10½ |
| Slate | 1 | 9 | 629 | 7½ |
| Fire clay | 3 | 4½ | 633 | 0 |
| Fire clay, hard, to bottom | 6 | 4 | 639 | 4 |

PLATE XIII.—View of Parsons from Cheat River Terrace south of Pulp Mill. Topography of Chemung Series modified by terraces in lower portion, one of which is plainly seen at left of steam column.

## Davis Coal & Coke Company No. 50 Coal Test Boring (41).

Grant County; on branch of North Branch of Potomac River, 0.3 mile east of Fairfax; authority, Davis Coal & Coke Company; completed, April 7, 1913; elevation, 2814' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 15 | 0 | 15 | 0 |
| Slate | 5 | 0 | 20 | 0 |
| Sandstone, **Grafton** | 10 | 0 | 30 | 0 |
| Shale, gray | 20 | 0 | 50 | 0 |
| Slate, gray | 6 | 0 | 56 | 0 |
| **Coal, Harlem** | 1 | 0 | 57 | 0 |
| Shale, gray | 3 | 0 | 60 | 0 |
| Shale, soft, broken, gray | 41 | 0 | 101 | 0 |
| Sandstone, white, **Saltsburg** | 29 | 0 | 130 | 0 |
| Shale, broken, gray | 19 | 0 | 149 | 0 |
| Shale, gray | 30 | 0 | 179 | 0 |
| Shale, broken, gray | 34 | 0 | 213 | 0 |
| Shale, gray | 25 | 0 | 238 | 0 |
| Shale, red | 4 | 0 | 242 | 0 |
| Shale, blue, sandy | 10 | 0 | 252 | 0 |
| Shale, gray | 16 | 0 | 268 | 0 |
| Slate, dark, **Brush Creek** | 5 | 0 | 273 | 0 |
| **Coal** 0' 4" / Binder 0 4 / **Coal** 1 10 } **Brush Creek** | 2 | 6 | 275 | 6 |
| Shale, broken, gray | 17 | 6 | 293 | 0 |
| Shale, gray | 28 | 0 | 321 | 0 |
| Sandstone 49' 0" / Sandstone, hard, gray 8 0 } **Lower Mahoning** | 57 | 0 | 378 | 0 |
| Slate, black | 15 | 0 | 393 | 0 |
| **Coal, Upper Freeport (Davis)** | 0 | 8 | 393 | 8 |
| Slate, black | 1 | 4 | 395 | 0 |
| Shale, dark, sandy | 10 | 0 | 405 | 0 |
| Shale, gray | 10 | 0 | 415 | 0 |
| Shale, soft, muddy | 7 | 0 | 422 | 0 |
| Slate, black | 31 | 0 | 453 | 0 |
| Shale, dark, sandy, with **coal** bands, **Upper Kittanning** | 12 | 0 | 465 | 0 |
| Shale, sandy | 3 | 0 | 468 | 0 |
| Sandstone, hard, **East Lynn** | 38 | 0 | 506 | 0 |
| Shale, gray | 10 | 0 | 516 | 0 |
| Slate, black | 5 | 6 | 521 | 6 |
| **Coal** 0' 6" / Slate 0 1 / **Coal** 0 6 } **Lower Kittanning** | 1 | 1 | 522 | 7 |
| Fire clay, hard | 8 | 6 | 531 | 1 |
| Shale, gray | 10 | 0 | 541 | 1 |
| Shale, dark | 14 | 0 | 555 | 1 |
| **Bone coal, Clarion** | 0 | 10 | 555 | 11 |
| Shale, gray | 17 | 2 | 573 | 1 |
| Slate, gray | 1 | 6 | 574 | 7 |
| **Coal** | 0 | 2 | 574 | 9 |
| Slate, gray | 17 | 4 | 592 | 1 |
| Shale, dark | 10 | 0 | 602 | 1 |

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Slate, dark | 18 | 0 | 620 | 1 |
| Shale, dark | 20 | 0 | 640 | 1 |
| Shale, dark, sandy | 9 | 0 | 649 | 1 |
| Conglomerate, **Upper Connoquenessing**, to bottom | 15 | 0 | 664 | 1 |

## Davis Coal & Coke Company No. 37 Coal Test Boring (42).

Grant County; on a branch of North Branch of Potomac River, 0.7 mile southeast of Fairfax; authority, Davis Coal & Coke Company; completed, July 26, 1910; elevation, 3157' L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Clay and boulders | 18 | 0 | 18 | 0 |
| Shale, soft, gray | 12 | 0 | 30 | 0 |
| Shale, dark | 14 | 4 | 44 | 4 |
| **Coal, Elk Lick (Barton)** | 1 | 3 | 45 | 7 |
| Shale, gray, with lime spots | 19 | 5 | 65 | 0 |
| Shale, sandy | 22 | 0 | 87 | 0 |
| Sandstone, **Grafton** | 40 | 0 | 127 | 0 |
| Shale, dark, **Ames** | 16 | 3 | 143 | 3 |
| Bone **coal** 0' 3"; **Coal** 1 5 — **Harlem** | 1 | 8 | 144 | 11 |
| Shale, gray | 36 | 1 | 181 | 0 |
| Shale, blue | 8 | 0 | 189 | 0 |
| Shale, blue, sandy | 20 | 0 | 209 | 0 |
| Sandstone | 7 | 0 | 216 | 0 |
| Shale, gray | 42 | 0 | 258 | 0 |
| Sandstone, **Saltsburg** | 15 | 3 | 273 | 3 |
| Shale, dark | 0 | 5 | 273 | 8 |
| **Coal, Bakerstown (Thomas)** | 2 | 11 | 276 | 7 |
| Shale, gray | 22 | 5 | 299 | 0 |
| Shale, sandy | 8 | 0 | 307 | 0 |
| Shale, blue | 9 | 0 | 316 | 0 |
| Shale, sandy | 15 | 0 | 331 | 0 |
| Shale, gray | 14 | 0 | 345 | 0 |
| Shale, dark, **Brush Creek** | 3 | 3 | 348 | 3 |
| **Coal, Brush Creek** | 1 | 5 | 349 | 8 |
| Shale, gray | 24 | 4 | 374 | 0 |
| Shale, sandy | 37 | 0 | 411 | 0 |
| Conglomerate, **Lower Mahoning** | 6 | 0 | 417 | 0 |
| Shale, dark | 8 | 9 | 425 | 9 |
| **Coal** 0' 8"; Shale, dark 0 10; **Coal** 0 7 — **Upper Freeport (Davis)** | 2 | 1 | 427 | 10 |
| Shale, black | 17 | 2 | 445 | 0 |
| Shale, gray | 13 | 0 | 458 | 0 |
| Shale | 3 | 0 | 461 | 0 |
| Bone **coal, Lower Freeport** | 1 | 0 | 462 | 0 |
| Shale | 3 | 0 | 465 | 0 |
| Shale, gray, to bottom | 27 | 0 | 492 | 0 |

## Davis Coal & Coke Company No. 120 Coal Test Boring (43).

Grant County; on a branch of North Branch of Potomac River, 1.3 miles southeast of Fairfax; authority, Davis Coal & Coke Company; completed, July, 1915; elevation, 3175′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Surface | 26 | 0 | 26 | 0 |
| Shale, light | 21 | 0 | 47 | 0 |
| Fire clay | 5 | 0 | 52 | 0 |
| Slate | 12 | 0 | 64 | 0 |
| Coal, Elk Lick | 0 | 8 | 64 | 8 |
| Fire clay | 4 | 4 | 69 | 0 |
| Shale, sandy | 33 | 0 | 102 | 0 |
| Sandstone, Upper Grafton | 37 | 0 | 139 | 0 |
| Shale, dark | 3 | 0 | 142 | 0 |
| Sandstone, hard, Grafton | 13 | 0 | 155 | 0 |
| Slate, Ames | 10 | 0 | 165 | 0 |
| Coal, Harlem | 1 | 6 | 166 | 6 |
| Fire clay | 19 | 6 | 186 | 0 |
| Slate, red 5′ 0″; Shale, variegated 14 0; Shale, sandy 12 0; Shale, red 2 0; Shale, sandy 5 0; Shale, variegated 12 0 — Pittsburgh Reds | 50 | 0 | 236 | 0 |
| Shale, sandy | 4 | 0 | 240 | 0 |
| Slate | 5 | 0 | 245 | 0 |
| Limestone, Ewing | 3 | 0 | 248 | 0 |
| Shale, red 10′ 0″; Shale, variegated 13 0 — Pittsburgh Reds. | 23 | 0 | 271 | 0 |
| Shale, sandy | 9 | 0 | 280 | 0 |
| Slate | 9 | 0 | 289 | 0 |
| Sandstone, Saltsburg | 3 | 0 | 292 | 0 |
| Coal, Bakerstown (Thomas) | 5 | 3 | 297 | 3 |
| Fire clay, to bottom | 1 | 9 | 299 | 0 |

## Davis Coal & Coke Company No. 51 Coal Test Boring (44).

Grant County; on branch of North Branch of Potomac River, 1.6 miles northeast of Fairfax; authority, Davis Coal & Coke Company; completed, April 7, 1913; elevation, 2868′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and sand | 5 | 0 | 5 | 0 |
| Conglomerate | 3 | 6 | 8 | 6 |
| Clay and gravel | 5 | 0 | 13 | 6 |
| Boulders | 1 | 6 | 15 | 0 |
| Clay, yellow | 4 | 0 | 19 | 0 |
| Shale, soft, light | 2 | 0 | 21 | 0 |
| Sandstone | 1 | 0 | 22 | 0 |
| Shale, gray | 5 | 0 | 27 | 0 |
| Sandstone, hard | 3 | 0 | 30 | 0 |
| Shale, sandy | 4 | 0 | 34 | 0 |
| Shale, soft, gray | 2 | 0 | 36 | 0 |

| | | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|---|
| Sandstone ............15′ 0″<br>Sandstone, hard....... 4 6 | Buffalo ...... | 19 | 6 | 55 | 6 |
| Coal, smutty, Brush Creek.................. | | 1 | 3 | 56 | 9 |
| Shale, soft, gray............................ | | 15 | 3 | 72 | 0 |
| Shale, limy.................................. | | 8 | 0 | 80 | 0 |
| Shale, with sandstone....................... | | 3 | 0 | 83 | 0 |
| Shale ........................................ | | 2 | 0 | 85 | 0 |
| Sandstone, hard.... 2′ 0″<br>Sandstone, shaly.... 6 0<br>Sandstone .........30 0 | Upper Mahoning. | 38 | 0 | 123 | 0 |
| Shale, soft, dark............................ | | 1 | 0 | 124 | 0 |
| Shale, hard, sandy.......................... | | 12 | 0 | 136 | 0 |
| Shale, limy.................................. | | 5 | 0 | 141 | 0 |
| Shale, soft, gray............................ | | 16 | 0 | 157 | 0 |
| Shale, sandy................................. | | 3 | 0 | 160 | 0 |
| Shale, dark.................................. | | 5 | 0 | 165 | 0 |
| Shale, black................................. | | 4 | 0 | 169 | 0 |
| Shale, sticky, gray.......................... | | 1 | 0 | 170 | 0 |
| Sandstone, Lower Mahoning................. | | 3 | 0 | 173 | 0 |
| Shale, sandy.......... 3′ 7″<br>Shale, black.......... 1 0 | Uffington..... | 4 | 7 | 177 | 7 |
| Coal, Upper Freeport (Davis)............... | | 4 | 3 | 181 | 10 |
| Fire clay..................................... | | 6 | 2 | 188 | 0 |
| Shale, gray, sticky.......................... | | 8 | 0 | 196 | 0 |
| Shale, limy.................................. | | 8 | 0 | 204 | 0 |
| Sandstone, hard, Upper Freeport............ | | 10 | 0 | 214 | 0 |
| Shale, hard, sandy.......................... | | 10 | 0 | 224 | 0 |
| Shale, dark, sticky.......................... | | 6 | 0 | 230 | 0 |
| Shale, sandy................................. | | 4 | 0 | 234 | 0 |
| Shale, with sandstone bands................ | | 4 | 0 | 238 | 0 |
| Shale, gray.................................. | | 12 | 0 | 250 | 0 |
| Shale, dark.................................. | | 6 | 0 | 256 | 0 |
| Slate ........................................ | | 0 | 3 | 256 | 3 |
| Bone coal...........0′ 6″<br>Coal ............... 0 4 | Upper Kittanning | 0 | 10 | 257 | 1 |
| Shale, gray.................................. | | 1 | 11 | 259 | 0 |
| Shale, with sandstone bands................ | | 9 | 0 | 268 | 0 |
| Shale, limy.................................. | | 12 | 0 | 280 | 0 |
| Shale, sandy................................. | | 21 | 0 | 301 | 0 |
| Sandstone, East Lynn....................... | | 14 | 0 | 315 | 0 |
| Shale, dark.................................. | | 17 | 0 | 332 | 0 |
| Shale, sandy................................. | | 8 | 0 | 340 | 0 |
| Shale, dark.................................. | | 1 | 2 | 341 | 2 |
| Coal .............. 0′ 4″<br>Slate .............. 0 5<br>Bone coal..........0 10 | Lower Kittanning | 1 | 7 | 342 | 9 |
| Slate ........................................ | | 0 | 2 | 342 | 11 |
| Fire clay..................................... | | 0 | 8 | 343 | 7 |
| Shale, with sandstone bands, Homewood horizon? ........................................ | | 18 | 0 | 361 | 7 |
| Shale, sandy................................. | | 3 | 0 | 364 | 7 |
| Shale, dark.................................. | | 16 | 0 | 380 | 7 |
| Shale, with coal, Upper Mercer?............ | | 5 | 0 | 385 | 7 |
| Shale, dark.................................. | | 5 | 0 | 390 | 7 |
| Fire clay, hard.............................. | | 20 | 0 | 410 | 7 |
| Shale, with sandstone bands................ | | 10 | 0 | 420 | 7 |

| | | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|---|
| Bone coal........... 2' 0" / Coal ................ 0 9 / Shale .............. 0 1½ / Coal ................ 0 4½ | Lower Mercer (Stockton)?... | 3 | 3 | 423 | 10 |
| Shale, gray.................................. | | 1 | 9 | 425 | 7 |
| Shale, black, and sulphur..................... | | 0 | 6 | 426 | 1 |
| Fire clay.................................... | | 5 | 6 | 431 | 7 |
| Shale, sandy................................. | | 5 | 0 | 436 | 7 |
| Sandstone, to bottom, Upper Connoquenessing? | | 3 | 0 | 439 | 7 |

## DETAILED COAL TEST RECORDS, DAVIS DISTRICT.

In Davis District 35 coal tests have been bored, the detailed records of which, as furnished by the Davis Coal & Coke Company through its Chief Engineer, Mr. S. B. Jeffries, of Thomas, and by the Wayne Coal Company through its General Manager, Mr. S. M. Dunbar, and its Chief Engineer, Mr. G. T. Warren, both of Pittsburgh, Pennsylvania, follow:

### Davis Coal & Coke Company No. 15 Coal Test Boring (45).

Davis District; on Pendleton Creek, 1 mile northwest of Davis; authority, Davis Coal & Coke Company; completed, May 6, 1910; elevation, 3123' L.

| | | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|---|
| Clay ........................................ | | 6 | 0 | 6 | 0 |
| Clay and boulders............................ | | 7 | 0 | 13 | 0 |
| Sandstone, Buffalo........................... | | 16 | 0 | 29 | 0 |
| Shale, sandy................................. | | 5 | 0 | 34 | 0 |
| Bone coal, Brush Creek....................... | | 0 | 3 | 34 | 3 |
| Shale, soft, gray............................ | | 4 | 9 | 39 | 0 |
| Sandstone, Upper Mahoning.................... | | 22 | 0 | 61 | 0 |
| Shale, gray.................................. | | 4 | 2 | 65 | 2 |
| Shale, black, mixed with coal, Mahoning..... | | 0 | 5 | 65 | 7 |
| Shale, gray.................................. | | 5 | 5 | 71 | 0 |
| Sandstone .........19' 0" / Shale, soft, gray.... 1 0 / Sandstone ......... 4 0 / Sandstone, hard..... 7 0 | Lower Mahoning. | 31 | 0 | 102 | 0 |
| Shale, dark, Uffington....................... | | 3 | 5 | 105 | 5 |
| Coal ....... 3' 1½" / Slate ...... 0 5 / Coal ........1 11 / Slate ...... 0 0½ / Coal ....... 1 2½ | Upper Freeport (Davis) | 6 | 8½ | 112 | 1½ |
| Shale, gray, to bottom....................... | | 2 | 4½ | 114 | 6 |

## Davis Coal & Coke Company No. 17 Coal Test Boring (46).

Davis District; on small branch of Pendleton Creek, 0.9 mile northwest of Davis; authority, Davis Coal & Coke Company; completed, June 30, 1914.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Gravel | 13 | 0 | 13 | 0 |
| Sandstone | 4 | 0 | 17 | 0 |
| Shale, light | 24 | 0 | 41 | 0 |
| Sandstone, hard, Upper Mahoning? | 15 | 0 | 56 | 0 |
| Fire clay | 3 | 0 | 59 | 0 |
| Fire clay, slaty | 0 | 6 | 59 | 6 |
| Fire clay | 2 | 0 | 61 | 6 |
| Shale, sandy | 22 | 6 | 84 | 0 |
| Fire clay, sandy | 31 | 0 | 115 | 0 |
| Shale and fire clay | 2 | 0 | 117 | 0 |
| Fire clay, sandy | 8 | 0 | 125 | 0 |
| Slate and fire clay | 3 | 0 | 128 | 0 |
| Coal, Upper Freeport? | 1 | 0 | 129 | 0 |
| Fire clay | 2 | 0 | 131 | 0 |
| Shale, sandy | 4 | 6 | 135 | 6 |
| Shale and fire clay | 11 | 6 | 147 | 0 |
| Fire clay | 9 | 0 | 156 | 0 |
| Slate | 0 | 6 | 156 | 6 |
| Coal ........ 0′ 6″ | | | | |
| Slate ........ 0 2 } Lower Freeport? | 1 | 5½ | 157 | 11½ |
| Coal ........ 0 9½ | | | | |
| Shale and fire clay | 9 | 0½ | 167 | 0 |
| Fire clay, sandy | 4 | 0 | 171 | 0 |
| Slate | 7 | 0 | 178 | 0 |
| Coal, Upper Kittanning? | 0 | 6 | 178 | 6 |
| Fire clay | 7 | 0 | 185 | 6 |
| Fire clay, sandy | 5 | 6 | 191 | 0 |
| Shale, sandy, to bottom | 9 | 0 | 200 | 0 |

## Davis Coal & Coke Company No. 16 Coal Test Boring (47).

Davis District; on small branch of Pendleton Creek, 0.9 mile northwest of Davis; authority, Davis Coal & Coke Company; completed, June 30, 1914.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and gravel | 20 | 6 | 20 | 6 |
| Sandstone | 4 | 0 | 24 | 6 |
| Fire clay | 1 | 0 | 25 | 6 |
| Sandstone, Upper Mahoning? | 22 | 0 | 47 | 6 |
| Shale, light | 2 | 0 | 49 | 6 |
| Shale, dark | 1 | 0 | 50 | 6 |
| Shale, sandy | 1 | 0 | 51 | 6 |
| Slate | 0 | 6 | 52 | 0 |
| Coal, Mahoning? | 0 | 4 | 52 | 4 |
| Fire clay | 10 | 0 | 62 | 4 |
| Shale, sandy | 29 | 0 | 91 | 4 |
| Fire clay | 21 | 8 | 113 | 0 |
| Coal, Upper Freeport (Davis)? | 0 | 11 | 113 | 11 |

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Fire clay, slaty | 1 | 0 | 114 | 11 |
| Shale, sandy | 3 | 1 | 118 | 0 |
| Sandstone | 5 | 0 | 123 | 0 |
| Fire clay, sandy | 5 | 0 | 128 | 0 |
| Shale, sandy | 25 | 10 | 153 | 10 |
| Fire clay, slaty | 0 | 8 | 154 | 6 |
| Shale, sandy, to bottom | 3 | 0 | 157 | 6 |

## Davis Coal & Coke Company No. 13 Coal Test Boring (48).

Davis District; on Pendleton Creek, 1.2 miles northwest of Davis; authority, Davis Coal & Coke Company; completed, October 21, 1914, elevation, 3055′ B.

| | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|
| Clay and gravel | | 25 | 0 | 25 | 0 |
| Sandstone, Upper Mahoning | | 32 | 0 | 57 | 0 |
| Fire clay, slaty | | 4 | 0 | 61 | 0 |
| Fire clay | | 24 | 0 | 85 | 0 |
| Sandstone, Lower Mahoning | | 14 | 0 | 99 | 0 |
| Fire clay, slaty | | 8 | 0 | 107 | 0 |
| Coal, bone, and slate 1′ 6″ | | | | | |
| Coal 1 8 | | | | | |
| Shale, dark 2 7 | | | | | |
| Coal 3 6 | | | | | |
| Slate 0 3 | Upper Freeport (Davis) | 14 | 2 | 121 | 2 |
| Coal 0 4 | | | | | |
| Slate 0 4 | | | | | |
| Coal 0 3 | | | | | |
| Slate 0 2 | | | | | |
| Coal 3 7 | | | | | |
| Fire clay, to bottom | | 2 | 0 | 123 | 2 |

## Davis Coal & Coke Company No. 14 Coal Test Boring (49).

Davis District; on a short branch of Pendleton Creek, 1.1 miles northwest of Davis; authority, Davis Coal & Coke Company; completed, October 22, 1914.

| | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|
| Clay and gravel | | 20 | 0 | 20 | 0 |
| Sandstone, Buffalo | | 22 | 0 | 42 | 0 |
| Fire clay | | 3 | 0 | 45 | 0 |
| Shale, sandy 14′ 0″ | Upper Mahoning | 20 | 0 | 65 | 0 |
| Sandstone 6 0 | | | | | |
| Slate and fire clay | | 2 | 0 | 67 | 0 |
| Shale, sandy | | 4 | 0 | 71 | 0 |
| Slate | | 1 | 0 | 72 | 0 |
| Coal and slate 1′ 4″ | | | | | |
| Fire clay 0 8 | Mahoning (?) | 2 | 2 | 74 | 2 |
| Coal 0 2 | | | | | |

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Fire clay | 5 | 10 | 80 | 0 |
| Shale, dark, sandy | 33 | 0 | 113 | 0 |
| Fire clay and limestone | 2 | 0 | 115 | 0 |
| Shale and fire clay | 15 | 0 | 130 | 0 |
| Slate | 2 | 0 | 132 | 0 |
| Coal and slate, Upper Freeport (Davis) (?) | 0 | 6 | 132 | 6 |
| Fire clay | 14 | 6 | 147 | 0 |
| Fire clay, sandy, to bottom | 13 | 0 | 160 | 0 |

The surface elevation of the above boring was not secured and the correlations are not regarded as certain. The coal at 132 feet may represent the Mahoning instead of the Upper Freeport.

## Davis Coal & Coke Company No. 21 Coal Test Boring (50).

Davis District; on a short branch of Pendleton Creek, 1 mile northwest of Davis; authority, Davis Coal & Coke Company; completed, October 21, 1914.

| | | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|---|
| Clay and gravel | | 35 | 0 | 35 | 0 |
| Shale, light | | 6 | 0 | 41 | 0 |
| Coal 1′ 0″; Binder 0 0½; Coal 3 5½ | Brush Creek | 4 | 6 | 45 | 6 |
| Fire clay | | 15 | 6 | 61 | 0 |
| Sandstone, Upper Mahoning | | 14 | 0 | 75 | 0 |
| Shale, red, Mahoning | | 6 | 0 | 81 | 0 |
| Shale, sandy | | 24 | 0 | 105 | 0 |
| Fire clay, Thornton | | 20 | 0 | 125 | 0 |
| Shale, sandy | | 5 | 0 | 130 | 0 |
| Sandstone 25′ 0″; Shale, sandy 6 0; Sandstone 19 0 | Lower Mahoning | 50 | 0 | 180 | 0 |
| Shale, dark, Uffington | | 9 | 0 | 189 | 0 |
| Slate, black | | 1 | 0 | 190 | 0 |
| Coal and slate 2′ 4″; Fire clay 0 5; Coal and slate 1 0 | Upper Freeport (Davis) | 3 | 9 | 193 | 9 |
| Fire clay | | 5 | 3 | 199 | 0 |
| Shale, sandy | | 12 | 0 | 211 | 0 |
| Fire clay, sandy | | 4 | 0 | 215 | 0 |
| Shale, dark | | 4 | 0 | 219 | 0 |
| Fire clay | | 4 | 0 | 223 | 0 |
| Shale and fire clay | | 19 | 0 | 242 | 0 |
| Shale, variegated | | 3 | 0 | 245 | 0 |
| Shale, sandy | | 15 | 0 | 260 | 0 |
| Limestone, Johnstown, to bottom | | 2 | 0 | 262 | 0 |

## Davis Coal & Coke Company No. 116 Coal Test Boring (51).

Davis District; on branch of Pendleton Creek, 1.1 miles northward from Davis; authority, Davis Coal & Coke Company; completed, May 28, 1915; elevation, 3258′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Surface | 30 | 0 | 30 | 0 |
| Sandstone, **Jane Lew** | 29 | 0 | 59 | 0 |
| Shale | 9 | 0 | 68 | 0 |
| Fire clay | 1 | 0 | 69 | 0 |
| **Coal** | 0 | 1 | 69 | 1 |
| Fire clay | 8 | 0 | 77 | 1 |
| Shale, sandy, **Saltsburg Sandstone** horizon | 12 | 0 | 89 | 1 |
| Shale, light | 15 | 0 | 104 | 1 |
| Slate | 0 | 11 | 105 | 0 |
| **Coal** ... 0′ 6″ | | | | |
| Shale ... 1 0 | | | | |
| **Coal** ... 1 2 — **Bakerstown** | | | | |
| Slate ... 0 1½ — **(Thomas)** | 4 | 4½ | 109 | 4½ |
| **Coal**, mixed with clay seams .. 1 7 | | | | |
| Fire clay, to bottom | 1 | 1½ | 110 | 6 |

## Davis Coal & Coke Company No. 117 Coal Test Boring (52).

Davis District; on small branch of Pendleton Creek, 2.3 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, June 9, 1915; elevation, 3262′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Surface | 18 | 0 | 18 | 0 |
| Shale | 12 | 0 | 30 | 0 |
| Sandstone, **Grafton** | 21 | 0 | 51 | 0 |
| Shale, light | 18 | 0 | 69 | 0 |
| Fire clay | 8 | 0 | 77 | 0 |
| Slate and fire clay | 2 | 0 | 79 | 0 |
| **Coal, Harlem** | 1 | 1 | 80 | 1 |
| Fire clay ... 19′ 0″ | | | | |
| Shale and fire clay. 2 11 | | | | |
| Fire clay ... 3 0 | | | | |
| Shale, sandy ... 7 0 — **Pittsburgh Reds.** | 47 | 5 | 127 | 6 |
| Shale, red ... 2 0 | | | | |
| Shale and fire clay. 1 6 | | | | |
| Shale ... 12 0 | | | | |
| Sandstone, **Jane Lew** | 13 | 0 | 140 | 6 |
| Shale ... 9′ 6″ | | | | |
| Shale, red ... 2 0 | | | | |
| Shale, variegated ... 13 0 — **Pittsburgh Reds.** | 29 | 6 | 170 | 0 |
| Shale and fire clay .. 3 0 | | | | |
| Fire clay ... 2 0 | | | | |
| Shale and fire clay | 26 | 0 | 196 | 0 |
| Slate | 4 | 10 | 200 | 10 |

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Coal .... 0' 3" | Bakerstown (Thomas) | 6 9 | 207 7 |
| Slate .... 1 2 | | | |
| Coal .... 0 3 | | | |
| Bone .... 0 5 | | | |
| Coal .... 0 2 | | | |
| Bone .... 0 4 | | | |
| Slate .... 0 2 | | | |
| Coal .... 4 0 | | | |
| Fire clay, to bottom | | 0 9 | 208 4 |

## Davis Coal & Coke Company No. 18 Coal Test Boring (53).

Davis District; on a short branch of Pendleton Creek, 0.7 mile northwest of Davis; authority Davis Coal & Coke Company; completed, July 14, 1914; elevation, 3125′ B. (?)

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Clay and gravel | | 23 0 | 23 0 |
| Sandstone, Upper Mahoning | | 26 0 | 49 0 |
| Coal, Mahoning | | 0 1 | 49 1 |
| Slate | | 4 0 | 53 1 |
| Shale, light | | 3 0 | 56 1 |
| Sandstone .... 1′ 11″ | Lower Mahoning. | 10 5 | 66 6 |
| Shale, dark .... 4 0 | | | |
| Shale and sandstone 1 6 | | | |
| Sandstone .... 3 0 | | | |
| Slate | | 0 6 | 67 0 |
| Coal .... 3′ 1″ | Upper Freeport (Davis) | 6 11 | 73 11 |
| Bony coal .... 0 6 | | | |
| Coal .... 0 3 | | | |
| Bony coal .... 1 0 | | | |
| Coal .... 1 0 | | | |
| Slate .... 0 1 | | | |
| Coal .... 1 0 | | | |
| Fire clay, to bottom | | 3 1 | 77 0 |

## Davis Coal & Coke Company No. 19 Coal Test Boring (54).

Davis District; on a branch of Beaver Creek, 0.7 mile northward from Davis; authority, Davis Coal & Coke Company; completed, May, 1910; elevation, 3195′ L.

| | | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|---|
| Clay | | 10 0 | 10 0 |
| Shale, mixed | | 17 0 | 27 0 |
| Sandstone | | 5 0 | 32 0 |
| Sandstone, shaly | | 19 0 | 51 0 |
| Shale, dark, Brush Creek | | 7 0 | 58 0 |
| Shale, sandy | | 5 0 | 63 0 |
| Sandstone, shaly .... 18′ 0″ | Upper Mahoning | 67 0 | 130 0 |
| Shale, gray .... 2 0 | | | |
| Sandstone .... 23 0 | | | |
| Shale, sandy .... 2 0 | | | |
| Sandstone .... 22 0 | | | |

| | | | | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|---|---|---|
| Shale, dark | | | | 1 | 10 | 131 | 10 |
| Coal | 0′ | 8″ | Mahoning | 2 | 11 | 134 | 9 |
| Shale, black | 2 | 0 | | | | | |
| Coal | 0 | 3 | | | | | |
| Shale, black | | | | 1 | 9 | 136 | 6 |
| Sandstone | 11′ | 6″ | Lower Mahoning | 30 | 6 | 167 | 0 |
| Shale, sandy | 9 | 0 | | | | | |
| Sandstone | 10 | 0 | | | | | |
| Shale, dark | | | | 2 | 7 | 169 | 7 |
| Coal | 3′ | 4″ | Upper Freeport (Davis) | 7 | 11 | 177 | 6 |
| Slate partings | 0 | 8 | | | | | |
| Coal | 0 | 2 | | | | | |
| Slate partings | 0 | 5 | | | | | |
| Coal | 1 | 10 | | | | | |
| Binder | 0 | 1 | | | | | |
| Coal | 1 | 5 | | | | | |
| Shale, gray, to bottom | | | | 1 | 6 | 179 | 0 |

## Davis Coal & Coke Company No. 23 Coal Test Boring (55).

Davis District; on a branch of Beaver Creek, 0.7 mile north of Davis; authority, Davis Coal & Coke Company; completed, May, 1910; elevation, 3141′ L.

| | | | | Thickness. Ft. | In | Total. Ft. | In. |
|---|---|---|---|---|---|---|---|
| Clay and gravel | | | | 10 | 0 | 10 | 0 |
| Sandstone, Buffalo | | | | 19 | 0 | 29 | 0 |
| Shale, sandy | | | | 2 | 0 | 31 | 0 |
| Coal, Brush Creek | | | | 0 | 7 | 31 | 7 |
| Shale, sandy | | | | 10 | 5 | 42 | 0 |
| Shale, gray | | | | 6 | 0 | 48 | 0 |
| Sandstone, Upper Mahoning | | | | 8 | 0 | 56 | 0 |
| Shale, gray | | | | 5 | 0 | 61 | 0 |
| Sandstone, shaly | 12′ | 0″ | Lower Mahoning | 58 | 0 | 119 | 0 |
| Sandstone, broken | 2 | 0 | | | | | |
| Sandstone, hard | 13 | 0 | | | | | |
| Shale, sandy | 20 | 0 | | | | | |
| Sandstone | 11 | 0 | | | | | |
| Shale, sandy | | | | 10 | 0 | 129 | 0 |
| Shale, gray | | | | 12 | 0 | 141 | 0 |
| Shale, black, Uffington | | | | 9 | 6 | 150 | 6 |
| Coal, Upper Freeport (Davis) | | | | 0 | 10 | 151 | 4 |
| Shale, dark | | | | 7 | 8 | 159 | 0 |
| Shale, sandy | | | | 3 | 0 | 162 | 0 |
| Shale, dark | | | | 1 | 4 | 163 | 4 |
| Coal, shaly | | | | 0 | 5 | 163 | 9 |
| Shale, black | | | | 0 | 5 | 164 | 2 |
| Shale, gray | | | | 18 | 10 | 183 | 0 |
| Sandstone, coarse, to bottom | | | | 7 | 0 | 190 | 0 |

## Davis Coal & Coke Company No. 22 Coal Test Boring (56).

Davis District; on a branch of Beaver Creek, 0.8 mile north of

Davis; authority, Davis Coal & Coke Company; completed, October 22,

| | Thickness. Ft. | Thickness. In. | Total. Ft. | Total. In. |
|---|---|---|---|---|
| Clay, with boulders and gravel | 12 | 6 | 12 | 6 |
| Sandstone, shaly | 3 | 6 | 16 | 0 |
| Shale, gray | 32 | 0 | 48 | 0 |
| Shale, sandy | 6 | 0 | 54 | 0 |
| Shale, of mixed colors | 5 | 0 | 59 | 0 |
| Shale, sandy | 19 | 0 | 78 | 0 |
| Sandstone, hard, **Upper Mahoning** | 36 | 0 | 114 | 0 |
| Shale, dark | 1 | 0 | 115 | 0 |
| Shale, gray | 2 | 0 | 117 | 0 |
| Sandstone, hard.......15′ 0″<br>Sandstone, hard, broken 6 0<br>Shale, soft, gray....... 2 0<br>Sandstone, hard.......22 0<br>Sandstone, hard, broken, 3 9 } **Lower Mahoning** | 48 | 9 | 165 | 9 |
| **Coal, Upper Freeport (Davis)** | 0 | 11 | 166 | 8 |
| Sandstone, hard, broken | 7 | 4 | 174 | 0 |
| Shale, dark | 3 | 0 | 177 | 0 |
| Rock, hard, black | 18 | 0 | 195 | 0 |
| Shale, hard, black | 2 | 0 | 197 | 0 |
| Shale, of mixed colors | 2 | 0 | 199 | 0 |
| Shale, gray, to bottom | 2 | 0 | 201 | 0 |

## Davis Coal & Coke Company No. 24 Coal Test Boring (57)

Davis District; on Lost Run of Beaver Creek, 1.7 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, June, 1910; elevation, 3119′ L.

| | Thickness. Ft. | Thickness. In. | Total. Ft. | Total. In. |
|---|---|---|---|---|
| Sand and boulders | 6 | 0 | 6 | 0 |
| Shale, clay | 16 | 0 | 22 | 0 |
| Shale, gray | 22 | 0 | 44 | 0 |
| Shale, sandy | 27 | 0 | 71 | 0 |
| Shale, black | 2 | 0 | 73 | 0 |
| Shale, dark | 6 | 0 | 79 | 0 |
| Sandstone, **Lower Mahoning** | 12 | 0 | 91 | 0 |
| Shale, gray | 3 | 0 | 94 | 0 |
| Shale, **coal** partings | 2 | 0 | 96 | 0 |
| Shale, dark | 3 | 0 | 99 | 0 |
| Shale, **coal** partings | 2 | 0 | 101 | 0 |
| Shale, dark | 3 | 6 | 104 | 6 |
| Shale, **coal** bands | 1 | 0 | 105 | 6 |
| **Coal** | 0 | 2 | 105 | 8 |
| Shale, black | 6 | 4 | 112 | 0 |
| Shale, gray | 14 | 0 | 126 | 0 |
| Sandstone | 1 | 0 | 127 | 0 |
| Shale, gray | 3 | 5 | 130 | 5 |
| **Coal** ......0′ 11″<br>Shale .....0 1<br>**Coal** ......1 11 } **Upper Freeport (Davis)** | 2 | 11 | 133 | 4 |
| Shale, gray, to bottom | 3 | 8 | 137 | 0 |

## Davis Coal & Coke Company No. 118 Coal Test Boring (58).

Davis District; on Lost Run of Beaver Creek, 2.3 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, June, 1915; elevation, 3191′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Surface | 17 | 0 | 17 | 0 |
| Sandstone 20′ 0″ | | | | |
| Shale 4 0 | | | | |
| Sandstone 9 0 | | | | |
| Shale, sandy 2 0 | | | | |
| Sandstone and slate 3 6 | | | | |
| Saltsburg | 38 | 0 | 55 | 6 |
| Coal 0′ 3″ | | | | |
| Bone 0 3½ | | | | |
| Coal 0 3½ | | | | |
| Bone 0 4½ | | | | |
| Coal 0 7 | | | | |
| Slate 0 8½ | | | | |
| Coal 2 11 | | | | |
| Bakerstown (Thomas) | 5 | 5 | 60 | 11 |
| Fire clay, to bottom | 1 | 3 | 62 | 2 |

## Davis Coal & Coke Company No. 54 Coal Test Boring (59).

Davis District; on Chaffey Run of Beaver Creek, 2.5 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, May 26, 1910; elevation, 3113′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and gravel | 14 | 0 | 14 | 0 |
| Shale, soft, gray | 40 | 0 | 54 | 0 |
| Sandstone, shaly 5′ 0″ | | | | |
| Sandstone 14 0 | | | | |
| Upper Mahoning | 19 | 0 | 73 | 0 |
| Shale, gray | 6 | 0 | 79 | 0 |
| Shale, sandy | 13 | 5 | 92 | 5 |
| Coal | 0 | 8 | 93 | 1 |
| Slate | 0 | 5 | 93 | 6 |
| Coal, shaly | 0 | 2 | 93 | 8 |
| Shale, sandy | 11 | 4 | 105 | 0 |
| Sandstone, Lower Mahoning | 4 | 0 | 109 | 0 |
| Shale, sandy | 13 | 1 | 122 | 1 |
| Coal 1′ 9″ | | | | |
| Slate 2 6 | | | | |
| Coal 3 2 | | | | |
| Slate 0 2 | | | | |
| Coal 0 4 | | | | |
| Upper Freeport (Davis) | 7 | 11 | 130 | 0 |
| Shale, coal partings | 0 | 2 | 130 | 2 |
| Shale, sandy, to bottom | 0 | 10 | 131 | 0 |

## Davis Coal & Coke Company No. 53 Coal Test Boring (60).

Davis District; on Chaffey Run of Beaver Creek, 2.8 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, June 2, 1910; elevation, 3144′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay | 8 | 0 | 8 | 0 |
| Sandstone, **Saltsburg** | 17 | 1 | 25 | 1 |
| **Coal** ..... 0′ 11″ / Slate ..... 0 3 / **Coal** ..... 4 2 } **Bakerstown (Thomas)** | 5 | 4 | 30 | 5 |
| Shale, gray | 11 | 7 | 42 | 0 |
| Sandstone | 15 | 0 | 57 | 0 |
| Shale, sandy | 3 | 0 | 60 | 0 |
| Shale, mixed | 7 | 0 | 67 | 0 |
| Shale, sandy | 3 | 0 | 70 | 0 |
| Sandstone, **Buffalo** | 11 | 0 | 81 | 0 |
| Shale, sandy | 16 | 9 | 97 | 9 |
| **Coal** ........ 0′ 5″ / Shale ........ 0 5 / **Coal** ........ 1 2 } **Brush Creek** | 2 | 0 | 99 | 9 |
| Shale, sandy | 13 | 3 | 113 | 0 |
| Shale, gray | 9 | 0 | 122 | 0 |
| Shale, sandy | 15 | 0 | 137 | 0 |
| Sandstone | 21 | 0 | 158 | 0 |
| Shale, gray | 6 | 0 | 164 | 0 |
| Shale, dark | 3 | 4 | 167 | 4 |
| Shale, mixed with **coal** | 0 | 5 | 167 | 9 |
| Shale, soft, gray | 1 | 3 | 169 | 0 |
| Sandstone, shaly, **Upper Mahoning** | 25 | 0 | 194 | 0 |
| Shale, dark | 6 | 3 | 200 | 3 |
| Bone **coal** ........ 0′ 2″ / Slate, with bone **coal** 0 7 } **Mahoning** | 0 | 9 | 201 | 0 |
| Shale, dark | 3 | 6 | 204 | 6 |
| Shale, sandy | 6 | 6 | 211 | 0 |
| Sandstone, shaly...10′ 6″ / Sandstone ........12 6 } **Lower Mahoning** | 23 | 0 | 234 | 0 |
| Shale, black, **Uffington** | 1 | 8 | 235 | 8 |
| **Coal** ..... 1′ 6″ / Shale ..... 0 2 / **Coal** ..... 2 8 / Shale ..... 0 3 / **Coal** ..... 0 3 } **Upper Freeport (Davis)** | 4 | 10 | 240 | 6 |
| Shale, gray to bottom | 6 | 6 | 247 | 0 |

## Davis Coal & Coke Company No. 119 Coal Test Boring (61).

Davis District; on Chaffey Run of Beaver Creek, 3 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, June 23, 1915; elevation, 3168′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Surface | 47 | 0 | 47 | 0 |
| Shale | 14 | 0 | 61 | 0 |
| Sandstone, **Jane Lew** | 16 | 0 | 77 | 0 |
| Shale | 13 | 0 | 90 | 0 |
| Fire clay | 4 | 0 | 94 | 0 |
| Shale and fire clay | 6 | 0 | 100 | 0 |
| Fire clay | 12 | 0 | 112 | 0 |
| Shale, sandy | 20 | 0 | 132 | 0 |

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Fire clay | 5 0 | 137 0 |
| Slate | 2 3 | 139 3 |
| Bone | 0 9 | 140 0 |
| Coal ..... 0' 2" / Slate ..... 0 2 / Coal .... 4 6 } Bakerstown (Thomas) | 4 10 | 144 10 |
| Fire clay, to bottom | 1 2 | 146 0 |

## Davis Coal & Coke Company No. 55 Coal Test Boring (62).

Davis District; on Hawkins Run of Beaver Creek, 3.4 miles northeast of Davis; authority, Davis Coal & Coke Company; completed, June 13, 1910; elevation, 3116' L.

| | Thickness. Ft. In. | Total. Ft. In. |
|---|---|---|
| Clay | 6 6 | 6 6 |
| Sandstone, shaly, Buffalo | 3 6 | 10 0 |
| Shale, sandy, Brush Creek | 14 4 | 24 4 |
| Coal .......... 0' 6" / Shale band .......... 0 2 / Coal .......... 1 7 } Brush Creek | 2 3 | 26 7 |
| Shale, gray | 1 5 | 28 0 |
| Shale, sandy | 12 0 | 40 0 |
| Shale, soft, gray | 13 0 | 53 0 |
| Shale, of mixed colors | 18 0 | 71 0 |
| Shale, sandy | 10 0 | 81 0 |
| Sandstone, hard......... 9' 0" / Sandstone, shaly.........10 0 / Sandstone, hard, with shale partings......... 6 6 } Upper Mahoning | 25 6 | 106 6 |
| Shale, black | 0 6 | 107 0 |
| Coal, Mahoning | 1 0 | 108 0 |
| Shale, dark | 7 5 | 115 5 |
| Bone | 0 5 | 115 10 |
| Slate | 0 2 | 116 0 |
| Bone | 0 2 | 116 2 |
| Shale, soft, gray | 8 10 | 125 0 |
| Shale, sandy, with hard sandstone bands | 18 0 | 143 0 |
| Sandstone, hard, Lower Mahoning | 3 0 | 146 0 |
| Shale, dark | 0 11 | 146 11 |
| Coal .... 0' 9" / Slate ... 0 11 / Coal .... 0 2 / Slate ... 1 11½ / Coal .... 1 2½ / Slate ... 0 1 / Coal ... 1 6½ } Upper Freeport (Davis) | 6 7½ | 153 6½ |
| Fire clay, to bottom | 1 11½ | 155 6 |

## Davis Coal & Coke Company No. 52 Coal Test Boring (63).

Davis District; on Hawkins Run of Beaver Creek, 1.7 miles southeast of Fairfax; authority, Davis Coal & Coke Company; completed, July 11, 1910; elevation, 3187' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay | 5 | 0 | 5 | 0 |
| Sand | 13 | 0 | 18 | 0 |
| Shale, gray | 4 | 0 | 22 | 0 |
| Shale, soft, gray | 31 | 0 | 53 | 0 |
| Sandstone, broken, Saltsburg | 5 | 0 | 58 | 0 |
| Shale, gray | 10 | 0 | 68 | 0 |
| Shale, gray, with sandstone bands | 5 | 0 | 73 | 0 |
| Shale, gray | 20 | 0 | 93 | 0 |
| Sandstone .......... 8′ 0″ } Buffalo<br>Sandstone, broken..... 8 0 } | 16 | 0 | 109 | 0 |
| Shale, sandy | 5 | 0 | 114 | 0 |
| Shale, dark, Brush Creek | 13 | 7 | 127 | 7 |
| Coal, Brush Creek | 1 | 10 | 129 | 5 |
| Shale, dark | 3 | 7 | 133 | 0 |
| Shale, gray | 55 | 0 | 188 | 0 |
| Shale, mixed | 18 | 0 | 206 | 0 |
| Shale, blue | 14 | 0 | 220 | 0 |
| Shale, mixed | 12 | 0 | 232 | 0 |
| Shale, gray | 26 | 0 | 258 | 0 |
| Shale, dark | 1 | 9 | 259 | 9 |
| Coal, bony. 0′ 2″ } Upper Freeport (Davis).<br>Coal ....... 4 1 } | 4 | 3 | 264 | 0 |
| Shale, gray | 14 | 0 | 278 | 0 |
| Sandstone, broken, Upper Freeport | 5 | 0 | 283 | 0 |
| Shale, sandy | 35 | 0 | 318 | 0 |
| Shale, dark | 16 | 11 | 334 | 11 |
| Bone coal, Upper Kittanning | 1 | 7 | 336 | 6 |
| Shale, gray | 44 | 6 | 381 | 0 |
| Shale, mixed | 24 | 0 | 405 | 0 |
| Sandstone, Kittanning | 7 | 0 | 412 | 0 |
| Shale, dark | 2 | 3 | 414 | 3 |
| Coal, Clarion, (Lower Kittanning?) | 1 | 2 | 415 | 5 |
| Shale, dark | 5 | 7 | 421 | 0 |
| Sandstone | 3 | 0 | 424 | 0 |
| Shale, sandy | 5 | 0 | 429 | 0 |
| Shale, dark | 11 | 0 | 440 | 0 |
| Bone coal | 0 | 4 | 440 | 4 |
| Shale, gray, sandy | 37 | 3 | 477 | 7 |
| Coal ..... 0′ 4″ }<br>Shale band 0 1 } (Clarion?) Upper Mercer.<br>Coal ..... 0 6 } | 0 | 11 | 478 | 6 |
| Shale, gray, to bottom | 4 | 6 | 483 | 0 |

## Davis Coal & Coke Company No. 56 Coal Test Boring (64).

Davis District; on a short branch of Beaver Creek, 2.5 miles southwest of Gatzmer; authority, Davis Coal & Coke Company; completed, June, 1910; elevation, 3150′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and boulders | 6 | 0 | 6 | 0 |
| Shale, clay | 5 | 0 | 11 | 0 |
| Shale, gray | 26 | 0 | 37 | 0 |
| Sandstone, Buffalo | 13 | 0 | 50 | 0 |

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Shale, gray, sandy | 22 | 0 | 72 | 0 |
| Shale, dark, Brush Creek | 0 | 7 | 72 | 7 |
| Coal, Brush Creek | 1 | 2 | 73 | 9 |
| Shale, gray | 1 | 3 | 75 | 0 |
| Shale, sandy, sandstone bands | 15 | 0 | 90 | 0 |
| Shale, gray | 11 | 0 | 101 | 0 |
| Shale, sandy | 20 | 0 | 121 | 0 |
| Shale, mixed | 12 | 0 | 133 | 0 |
| Shale, gray | 4 | 0 | 137 | 0 |
| Shale, sandy | 20 | 0 | 157 | 0 |
| Sandstone ......... 8′ 4″ } Upper Mahoning. | 9 | 4 | 166 | 4 |
| Conglomerate ..... 1 0 | | | | |
| Coal .............. 0′ 9″ | | | | |
| Shale, dark......... 1 0 } Mahoning ....... | 2 | 2 | 168 | 6 |
| Coal .............. 0 5 | | | | |
| Shale, dark | 4 | 6 | 173 | 0 |
| Shale, with sandstone bands, Lower Mahoning | 22 | 0 | 195 | 0 |
| Shale, dark, sandy | 2 | 3 | 197 | 3 |
| Coal .... 0′ 5½″ | | | | |
| Shale ... 0 0½ | | | | |
| Coal .... 0 9½ | | | | |
| Shale ... 0 10 | | | | |
| Coal .... 0 4 } Upper Freeport (Davis).. | 6 | 2 | 203 | 5 |
| Shale ... 0 2 | | | | |
| Coal .... 1 9½ | | | | |
| Shale ... 0 2 | | | | |
| Coal .... 1 7 | | | | |
| Fire clay, to bottom | 1 | 7 | 205 | 0 |

## Davis Coal & Coke Company No. 121 Coal Test Boring (65).

Davis District; on a short branch of Beaver Creek, 1.8 miles westward from Gatzmer; authority, Davis Coal & Coke Company; completed, July 1, 1910.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay | 6 | 0 | 6 | 0 |
| Sand and gravel | 4 | 0 | 10 | 0 |
| Sandstone | 4 | 0 | 14 | 0 |
| Shale, gray | 5 | 0 | 19 | 0 |
| Sandstone, Saltsburg | 16 | 0 | 35 | 0 |
| Bone | 1 | 1 | 36 | 1 |
| Shale | 0 | 2 | 36 | 3 |
| Coal, Bakerstown (Thomas) | 3 | 1 | 39 | 4 |
| Shale, gray | 15 | 8 | 55 | 0 |
| Sandstone, Buffalo | 26 | 0 | 81 | 0 |
| Shale, sandy | 17 | 0 | 98 | 0 |
| Shale, gray | 5 | 0 | 103 | 0 |
| Shale, dark, sandy, Brush Creek | 4 | 7 | 107 | 7 |
| Coal, Brush Creek | 1 | 4 | 108 | 11 |
| Shale, dark | 1 | 1 | 110 | 0 |
| Shale, tough, sandy | 18 | 0 | 128 | 0 |
| Shale, gray, sticky | 14 | 0 | 142 | 0 |
| Shale, gray | 18 | 0 | 160 | 0 |

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Shale, mixed | 4 | 0 | 164 | 0 |
| Shale, soft, sticky | 5 | 0 | 169 | 0 |
| Shale, sandy | 4 | 0 | 173 | 0 |
| Sandstone, shaly, Upper Mahoning | 17 | 0 | 190 | 0 |
| Shale, black, with coal bands, Mahoning | 2 | 0 | 192 | 0 |
| Shale, dark | 3 | 0 | 195 | 0 |
| Shale, gray | 12 | 0 | 207 | 0 |
| Shale, gray, with sandstone bands | 15 | 0 | 222 | 0 |
| Shale, black | 0 | 4 | 222 | 4 |
| Coal ...... 2′ 11″; Shale ..... 0 5; Coal ...... 0 3; Shale ..... 0 2; Coal ...... 3 4 } Upper Freeport (Davis) | 7 | 1 | 229 | 5 |
| Fire clay, to bottom | 4 | 7 | 234 | 0 |

## Herr & Company No. 1 Coal Test Boring (66).

Davis District; on Beaver Creek, 1.4 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3129′ L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Clay and small boulders | 10 | 0 | 10 | 0 |
| Boulders, large | 2 | 0 | 12 | 0 |
| Boulders, small | 2 | 0 | 14 | 0 |
| Boulders, large | 2 | 0 | 16 | 0 |
| Boulders and coal mixed | 3 | 6 | 19 | 6 |
| Coal, Upper Freeport (Davis) | 2 | 2 | 21 | 8 |
| Fire clay, to bottom | 3 | 4 | 25 | 0 |

## Herr & Company No. 2 Coal Test Boring (67).

Davis District; on Beaver Creek, 1.5 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3139′ L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Clay and small boulders | 9 | 0 | 9 | 0 |
| Coal, Upper Freeport (Davis) | 5 | 0 | 14 | 0 |
| Fire clay, to bottom | 1 | 0 | 15 | 0 |

## Herr & Company No. 3 Coal Test Boring (68).

Davis District; on Beaver Creek, 1.3 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3151′ L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Clay and small boulders | 10 | 0 | 10 | 0 |
| Coal ........... 3′ 0″; Sandstone, hard 1 0; Coal ........... 4 0 } Upper Freeport (Davis) | 8 | 0 | 18 | 0 |
| Fire clay, to bottom | 2 | 0 | 20 | 0 |

## Herr & Company No. 4 Coal Test Boring (69).

Davis District; on Beaver Creek, 1.3 miles southwest of Gatzmer; authority, Wayne Coal Company, completed, 1919; elevation, 3173′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay | 16 | 0 | 16 | 0 |
| Slate, black | 1 | 0 | 17 | 0 |
| Coal ........ 3′ 7″ / Bone binder.. 0 6 / Coal ........ 3 3 } Upper Freeport (Davis) | 7 | 4 | 24 | 4 |
| Fire clay, to bottom | 1 | 8 | 26 | 0 |

## Herr & Company No. 6 Coal Test Boring (70).

Davis District; on Beaver Creek, 1.4 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3210′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Surface and boulders | 14 | 0 | 14 | 0 |
| Sandrock, hard, broken, Lower Mahoning | 11 | 0 | 25 | 0 |
| Shale, soft, Uffington | 10 | 6 | 35 | 6 |
| Shale, hard, sandy | 1 | 0 | 36 | 6 |
| Coal ...... 2′ 11″ / Binder ... 2 4 / Coal ...... 1 7 / Binder ... 0 3 / Coal ...... 1 2 } Upper Freeport (Davis) | 8 | 3 | 44 | 9 |
| Fire clay, to bottom | 0 | 3 | 45 | 0 |

## Herr & Company No. 5 Coal Test Boring (71).

Davis District; on Beaver Creek, 1.3 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3252′ L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and small boulders | 20 | 3 | 20 | 3 |
| Sandstone ...... 1′ 0″ / Shale, blue...... 0 6 / Sandrock ....... 3 9 } Lower Mahoning | 5 | 3 | 25 | 6 |
| Shale, blue, Uffington | 10 | 0 | 35 | 6 |
| Old workings, to bottom, Upper Freeport (Davis) Coal | 8 | 11 | 44 | 5 |

## Herr & Company No. 7 Coal Test Boring (72).

Davis District; on Beaver Creek, 1.3 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay and boulders | 4 | 0 | 4 | 0 |
| Clay | 11 | 0 | 15 | 0 |
| Hard pan | 15 | 0 | 30 | 0 |

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Sand, loose | 2 | 0 | 32 | 0 |
| Shale, blue | 3 | 0 | 35 | 0 |
| Pebbles, small | 2 | 0 | 37 | 0 |
| Shale, streaks of light and blue | 15 | 0 | 52 | 0 |
| Shale, sandy | 8 | 0 | 60 | 0 |
| Shale, dark, to bottom | 10 | 0 | 70 | 0 |

## Herr & Company No. 8 Coal Test Boring (73).

Davis District; on Beaver Creek, 1.2 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3357′ L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Surface and clay sand | 38 | 0 | 38 | 0 |
| Sandrock, hard, gray, Lower Mahoning | 6 | 0 | 44 | 0 |
| Slate, black | 3 | 0 | 47 | 0 |
| Coal ......... 3′ 0″ / Coal and slate 1 6 / Coal ......... 1 9 / Bone ........ 0 2 / Coal ......... 0 11 } Upper Freeport (Davis) | 7 | 4 | 54 | 4 |
| Fire clay, to bottom | 0 | 7 | 54 | 11 |

## Herr & Company No. 9 Coal Test Boring (74).

Davis District; on ridge south of Beaver Creek, 1.2 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3400′ B.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Surface and clay | 28 | 0 | 28 | 0 |
| Sandrock, gray, Lower Mahoning | 16 | 0 | 44 | 0 |
| Shale, dark, Uffington | 3 | 0 | 47 | 0 |
| Coal ...... 1′ 3″ / Bone ..... 1 0 / Coal ...... 0 9 / Bone ..... 1 0 / Coal ...... 3 4 } Upper Freeport (Davis) | 7 | 4 | 54 | 4 |
| Fire clay, to bottom | 0 | 8 | 55 | 0 |

## Herr & Company No. 12 Coal Test Boring (75).

Davis District; on ridge south of Beaver Creek, 1.3 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3396′ L.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Boulders | 5 | 0 | 5 | 0 |
| Clay | 24 | 6 | 29 | 6 |
| Coal, Upper Freeport (Davis) | 5 | 1 | 34 | 7 |
| Fire clay, to bottom | 0 | 5 | 35 | 0 |

## Herr & Company No. 10 Coal Test Boring (76).

Davis District; on ridge south of Beaver Creek, 1.4 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3409' L.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Clay | 8 | 6 | 8 | 6 |
| Coal, Upper Freeport (Davis) | 5 | 3 | 13 | 9 |
| Fire clay, to bottom | 0 | 3 | 14 | 0 |

## Herr & Company No. 11 Coal Test Boring (77).

Davis District; on a branch of Beaver Creek, 1.1 miles southwest of Gatzmer; authority, Wayne Coal Company; completed, 1919; elevation, 3410' B.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Sand and clay | 30 | 0 | 30 | 0 |
| Shale, sandy | 8 | 0 | 38 | 0 |
| Shale, dark, (trace coal) | 4 | 0 | 42 | 0 |
| Fire clay | 6 | 0 | 48 | 0 |
| Shale, sandy, to bottom | 6 | 0 | 54 | 0 |

### DETAILED COAL TEST RECORDS, DRY FORK DISTRICT.

In Dry Fork District four tests have been bored for coal, all on the high plateau northeast of Laneville, along the Stony River Syncline. Of these records the Bridges Heirs No. 2 (No. 81 on Map II) was used in the section for Big Stonecoal Run, Page 141, and the Bridges Heirs No. 4 (No. 84 on Map II) appears in the section for Red Creek, page 143. The other two, as furnished by a representative of the Bridges Estate, follow:

## Robert Bridges Heirs No. 3 Coal Test Boring (82).

Dry Fork District; on Stonecoal Run, 4 miles northeast of Laneville; authority, Robert Bridges Heirs; elevation, 3665' B.

| | Thickness. Ft. | In. | Total. Ft. | In. |
|---|---|---|---|---|
| Boulders | 5 | 0 | 5 | 0 |
| Sandstone, Upper Mahoning | 15 | 0 | 20 | 0 |
| Shale, soft, variegated, Mahoning | 4 | 0 | 24 | 0 |
| Shale, blue | 5 | 0 | 29 | 0 |
| Shale, dark | 3 | 11 | 32 | 11 |
| Coal, dirty, Mahoning | 0 | 1 | 33 | 0 |
| Fire clay | 3 | 0 | 36 | 0 |
| Shale, light, sandy | 1 | 0 | 37 | 0 |
| Shale, sandy | 5 | 1 | 42 | 1 |
| Coal, Upper Freeport (Davis) | 1 | 11 | 44 | 0 |

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Fire clay | 0 | 2 | 44 | 2 |
| Sandstone, Upper Freeport | 8 | 10 | 53 | 0 |
| Shale, sandy | 25 | 0 | 78 | 0 |
| Sandstone, Lower Freeport | 49 | 8 | 127 | 8 |
| Clay | 0 | 10 | 128 | 6 |
| Shale, dark, tough | 15 | 6 | 144 | 0 |
| Shale, light | 2 | 0 | 146 | 0 |
| Shale, sandy, to bottom | 3 | 0 | 149 | 0 |

### Robert Bridges Heirs No. 1 Coal Test Boring (83).

Dry Fork District; on Stonecoal Run of Red Creek, 4.4 miles northeast of Laneville; authority, Robert Bridges Heirs; elevation, 3680' B.

| | Thickness. Ft. In. | | Total. Ft. In. | |
|---|---|---|---|---|
| Sand and broken rock | 8 | 0 | 8 | 0 |
| Sand | 8 | 0 | 16 | 0 |
| Sandstone, Buffalo | 10 | 0 | 26 | 0 |
| Shale, sandy | 14 | 0 | 40 | 0 |
| Sandstone | 1 | 0 | 41 | 0 |
| Shale, sandy | 18 | 0 | 59 | 0 |
| Sandstone, hard, Upper Mahoning | 27 | 6 | 86 | 6 |
| Shale, soft, sandy | 1 | 6 | 88 | 0 |
| Shale, sandy, Lower Mahoning Sandstone horizon | 34 | 0 | 122 | 0 |
| Shale, dark, Uffington | 5 | 4 | 127 | 4 |
| Coal, Upper Freeport (Davis) | 1 | 5 | 128 | 9 |
| Shale, sandy | 19 | 3 | 148 | 0 |
| Sandstone, Upper Freeport, to bottom | 63 | 0 | 211 | 0 |

## MINABLE COALS OF THE MONONGAHELA SERIES.

### PITTSBURGH COAL.

The Pittsburgh Coal, discussed previously in Chapter V, page 148, and shown by outcrop lines on Map II, occurs only in the vicinity of Fairfax, where it was once mined in Fairfax Knob, and according to Dr. I. C. White, was one opened in Roger Camp Hill, about one-half mile southeast of Fairfax Summit, there being a few acres of coal at each locality, mostly in Grant County. In Fairfax Knob it has been mined out almost completely, either by drift or stripping, and the old openings have fallen shut. Figure 7 shows it areal extent. The following exposure, measured on a badly weathered outcrop, shows its bed section:

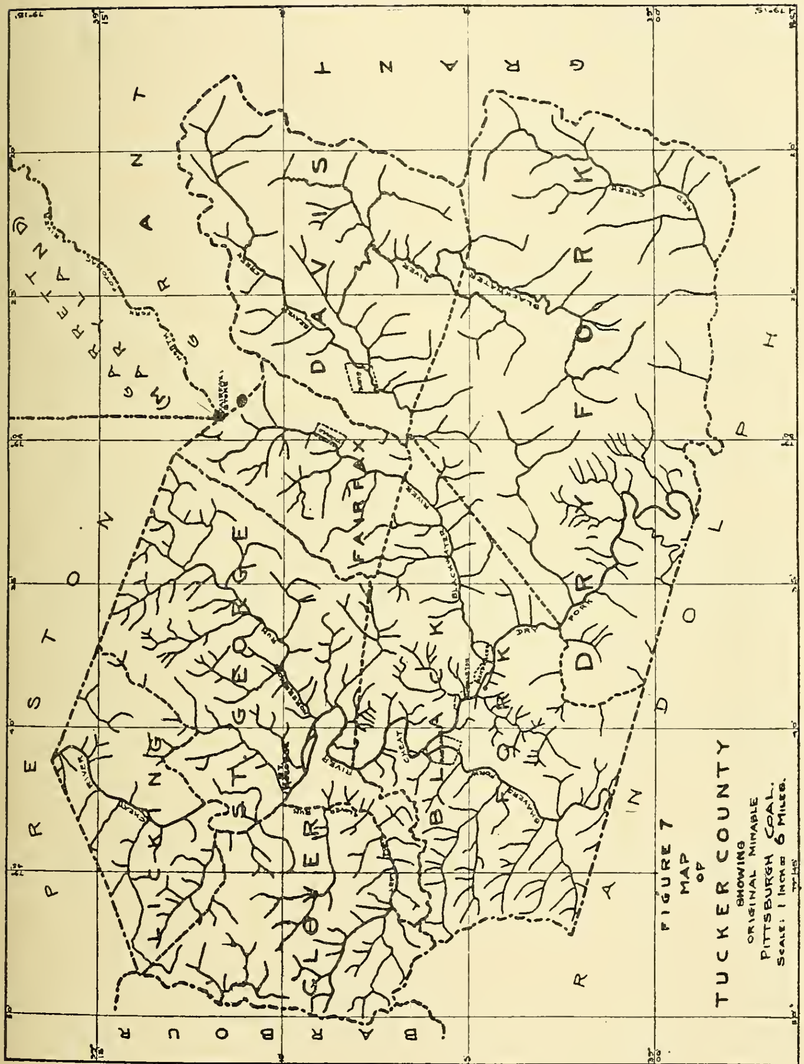


FIGURE 7
MAP
OF
TUCKER COUNTY
SHOWING
ORIGINAL MINABLE
PITTSBURGH COAL.
SCALE: 1 INCH = 6 MILES.

### Davis Coal & Coke Company Mine—No. 2 on Map II.

In Grant County, on south slope of Fairfax Knob; **Pittsburgh Coal**; elevation, 3195′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| **Coal** | 0′ | 6″ | | |
| Shale, gray | 0 | 2 | | |
| **Coal** | 9 | 9 | | |
| Shale, gray | 1 | 0 | | |
| **Coal** | 1 | 0 | 12 | 5 |

There is little probability that any further coal can be recovered from the Pittsburgh seam in the remnants of its outcrop in Tucker County.

## MINABLE COALS OF THE CONEMAUGH SERIES.

### LITTLE PITTSBURGH COAL.

The Little Pittsburgh Coal, previously discussed in Chapter V, page 157; and shown by outcrop lines on Map II in that part of the county in which it occurs, is found only in the vicinity of Fairfax Summit, there being a few acres in Fairfax Knob north of the railroad and a few acres in Roger Camp Hill south of the railroad. Figure 8 shows its areal extent. In former years the coal was mined commercially in Fairfax Knob but the plant is not now in operation. The following section was measured at the old opening:

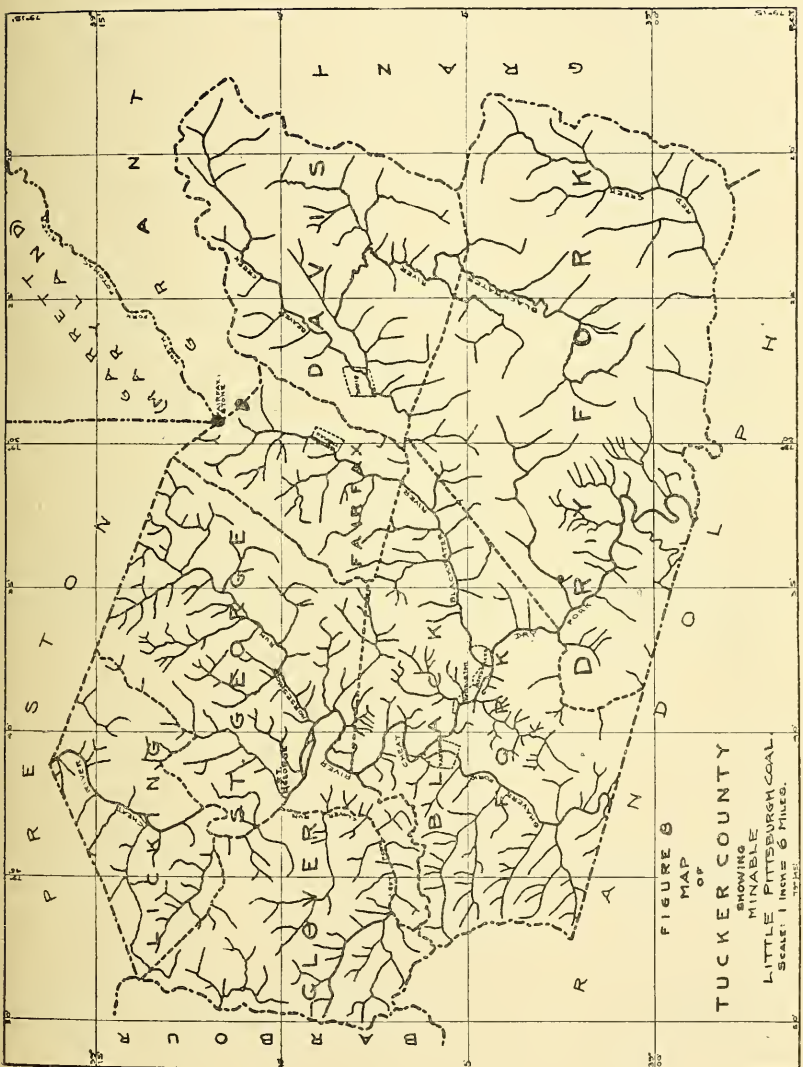


FIGURE 8
MAP
OF
TUCKER COUNTY
SHOWING
MINABLE
LITTLE PITTSBURGH COAL.
SCALE: 1 INCH = 6 MILES.

### Davis Coal & Coke Company Mine No. 61—No. 4 on Map II.

In Grant County, 0.2 mile north of Fairfax Summit; **Little Pittsburgh Coal**; elevation, 3100′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, shaly, and sandy shale........... | | | 10 | 0 |
| 2. | Shale, dark, with coal streaks.............. | | | 1 | 6 |
| 3. | Coal, hard............... | 0′ | 8″ | | |
| 4. | Shale, dark.............. | 1 | 8 | | |
| 5. | Coal, good, soft.......... | 3 | 0 | | |
| 6. | Shale, gray.............. | 0 | 6 | | |
| 7. | Coal .................... | 0 | 7 ............ | 6 | 5 |
| 8. | Shale, pavement............................ | | | | |

A sample (No. 383R) was collected from No. 5 of section, the composition of which is published under **Mine No. 4** in the Table of Coal Analyses at the end of this Chapter. The analysis reveals a coal low in sulphur and ash but rather high in phosphorus.

### *Quantity of Little Pittsburgh Coal Available.*

The following table, compiled by Tucker, from a planimetric measurement of the outcrop of the coal on Map II, shows the probable amount of Little Pittsburgh Coal in the district which contains it:

**Probable Amount of Little Pittsburgh Coal.**

| Tucker County by Districts. | Thickness of Coal Assumed. Feet. | Square Miles. | Acres. | Cubic Feet of Coal. | Short Tons of Coal. (2000 Lbs.) |
|---|---|---|---|---|---|
| Fairfax ................ | 3 | 0.07 | 45 | 5,880,600 | 235,224 |
| Totals ............ | ...... | 0.07 | 45 | 5,880,600 | 235,224 |

## BAKERSTOWN (THOMAS) COAL.

The Bakerstown (Thomas) Coal, previously described in Chapter V, pages 166-169, which, as therein explained, has long been erroneously known as the Upper Freeport Coal in Tucker County, is a valuable bed of fuel in Fairfax and Davis Districts, in portions of which it is present along the North Potomac Syncline. It usually varies in thickness from 3 to 8 feet, being sometimes entirely absent in restricted localities, as shown by the records of coal test borings published in this Chapter, the most extensive area of this sort being at the head of North Fork of Blackwater River in the vicinity of Pierce and Fairfax Knob. It has been mined extensively by drift openings in the vicinity of Thomas and Davis. In this region it contains a hard, bony parting, one foot or more in thickness, near the middle of the bed, there being benches of good, soft coal above and below, which are recovered by pick mining. In chemical quality it is low in sulphur and volatile matter, but medium-high in ash and phosphorus, being used mainly for steam and coking coal. Map II shows its outcrop and Figure 9 its areal extent. Detailed descriptions of mines and prospects in the two districts follow:

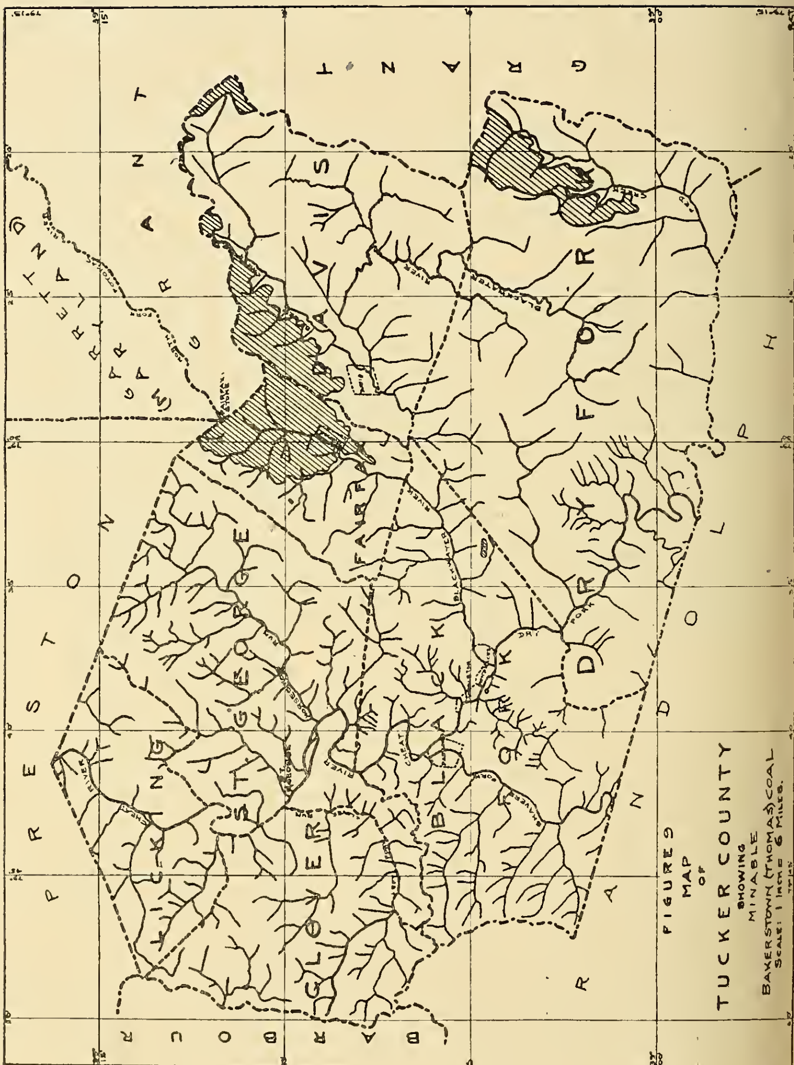


FIGURE 9
MAP
OF
TUCKER COUNTY
SHOWING
MINABLE
BAKERSTOWN (THOMAS) COAL
SCALE: 1 INCH = 6 MILES.

### *Bakerstown (Thomas) Coal, Fairfax District.*

In Fairfax District, the Bakerstown (Thomas) Coal is present along the North Potomac Basin northeast of Douglas, as shown by its outcrop on Map II, being high in the hilltops at Douglas, but descending northeastward along the syncline and going under drainage just above Thomas, there being an outcrop on the west that extends northward to the Preston County Line. The following mines and prospects were observed:

**Davis Coal & Coke Company No. 24 Mine—No. 11 on Map II.**

On south side of North Fork of Blackwater River, 0.4 mile south of Coketon; **Bakerstown (Thomas) Coal**; elevation, 3105' L.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Draw slate | | | | |
| 2. | **Coal**, soft, columnar | 2' | 0" | | |
| 3. | **Coal**, bony | 0 | 4½ | | |
| 4. | **Coal** | 0 | 5 | | |
| 5. | **Coal**, bony | 0 | 5 | | |
| 6. | **Coal** | 0 | 8 | | |
| 7. | Slate, bony | 0 | 2 | | |
| 8. | **Coal**, soft | 0 | 5½ | | |
| 9. | Slate, dark | 0 | 0½ | | |
| 10. | **Coal**, soft | 3 | 4 | 7 | 10½ |
| 11. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 100 tons when in operation; electric haulage; coal shipped east for steam fuel and by-product coke; greatest rise, southeast; sample (No. 394R) collected from Nos. 2, 4, 6, 8, and 10 of section, in room off Cook Heading, by D. B. Reger; A. L. McCluckie, Staff Engineer, authority for mine data."

The composition of this sample is published under **Mine No. 11** in the Table of Coal Analyses at the end of this Chapter.

**Davis Coal & Coke Company No. 27 Mine—No. 12 on Map II.**

On north side of North Fork of Blackwater River, 0.3 mile southwest of Coketon; **Bakerstown (Thomas) Coal**; elevation, 3067' L.

| | | | Ft. | In. |
|---|---|---|---|---|
| Slate, soft | | | | |
| **Coal**, soft | 2' | 10" | | |
| Slate, dark | 0 | 3 | | |
| **Coal**, soft | 3 | 10 | 6 | 11 |

The above mine has been abandoned, the section having been measured at the mouth of the entry.

### Davis Coal & Coke Company No. 26 Mine—No. 13 on Map II.

On Snyder Run of North Fork, 0.4 mile northwestward from Coketon; **Bakerstown (Thomas) Coal**; elevation, 3019′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, dark | | | | |
| **Coal**, soft | 1′ | 11″ | | |
| **Coal**, medium-hard | 1 | 11 | | |
| Bone | 0 | 3 | | |
| **Coal**, soft | 2 | 9 | 6 | 10 |
| Slate, pavement | | | | |

The above mine is no longer in operation, the section having been secured near the mouth of the entry.

### Davis Coal & Coke Company No. 28 Mine—No. 14 on Map II.

On Snyder Run of North Fork, 0.6 mile south of Benbush; **Bakerstown (Thomas) Coal**; elevation, 2986′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, dark | | | | |
| **Coal** | 1′ | 11″ | | |
| Slate, dark, hard | 0 | 4 | | |
| **Coal** | 3 | 0 | 5 | 3 |
| Slate, pavement | | | | |

The above mine is no longer in operation, the section having been measured near the mouth of the entry.

### West Virginia Central & Pittsburgh Railroad Exposure—No. 15 on Map II.

Along Sugarland road, 1.2 miles westward from Benbush; **Bakerstown (Thomas) Coal**; elevation, 3265′ B.

**Coal blossom**, thickness unknown, comes a few feet under coarse sandstone.

### Davis Coal & Coke Company No. 25 Mine—No. 16 on Map II.

On west side of North Fork of Blackwater River, at Thomas; **Bakerstown (Thomas) Coal**; elevation, 2985′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Sandstone, massive, **Saltsburg** | | | | |
| 2. **Coal**, soft | 2′ | 3½″ | | |
| 3. **Coal**, bony | 0 | 3 | | |

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 4. | Coal, soft | 0′ | 5″ | | |
| 5. | Coal, bony | 0 | 2½ | | |
| 6. | Coal | 0 | 5½ | | |
| 7. | Coal, bony | 0 | 1 | | |
| 8. | Coal, soft | 0 | 7 | | |
| 9. | Slate, dark | 0 | 2½ | | |
| 10. | Coal, soft | 3 | 10 | 8 | 4 |
| 11. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 225 tons; 35 miners and 18 laborers employed; electric haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, N. 18° W.; faces, S. 72° W.; greatest rise, southwest; sample (No. 390R) collected from Nos. 2, 4, 6, 8, and 10 of section in Second Left (Johnson) Heading by D. B. Reger; Matthew Blair, Assistant General Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 16** in the Table of Coal Analyses at the end of this Chapter.

## Davis Coal & Coke Company No. 23 (Thomas Drift) Mine—No. 17 on Map II.

On east side of North Fork of Blackwater River at Thomas; **Bakerstown (Thomas) Coal**; elevation, 2992′ L.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive | | | | |
| 2. | Slate, dark | | | 0 | 5 |
| 3. | Coal, soft | 3′ | 4″ | | |
| 4. | Coal, bony | 1 | 6 | | |
| 5. | Slate, dark | 0 | 1 | | |
| 6. | Coal, bony | 0 | 5 | | |
| 7. | Coal, soft | 3 | 9 | 8 | 1 |
| 8. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 325 tons; 50 miners and 22 laborers employed; coal shipped east for steam fuel and by-product coke manufacture; butts, N. W.; faces, N. E.; greatest rise, southeast; sample (No. 391R) collected from Room No. 12 off First Right (Davis) Heading by D. B. Reger; Matthew Blair, Assistant General Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 17** in the Table of Coal Analyses at the end of this Chapter.

The above mine has been driven through the hill to Pendleton Creek, where the following section was secured at the mouth of the entry just west of the creek:

### Davis Coal & Coke Company No. 23 Mine (Pendleton Creek Entry)—No. 18 on Map II.

On west side of Pendleton Creek, 1.3 miles northeast of Thomas; Bakerstown (Thomas) Coal; elevation, 3085′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, dark | | | | |
| Coal, bony | 0′ | 6″ | | |
| Coal, soft | 1 | 11 | | |
| Slate, bony | 0 | 1 | | |
| Coal, soft | 1 | 2½ | | |
| Slate, bony | 0 | 3 | | |
| Coal, soft | 4 | 0½ | 8 | 0 |
| Slate, pavement | | | | |

### West Virginia Central & Pittsburgh Railroad Exposure—No. 19 on Map II.

On west side of Pendleton Creek, 0.7 mile southeast of Thomas; Bakerstown (Thomas) Coal; elevation, 3095′ B.

Coal blossom, thickness unknown.

### *Bakerstown (Thomas) Coal, Davis District.*

In Davis District the outcrop of the Bakerstown (Thomas) Coal extends from a point on Pendleton Creek, 1½ miles northwest of Davis, northeastward up the north side of Beaver Creek with the general contour of the hills, passing across the axis of the Blackwater Anticline and then turning southward, and goes into Grant County about 4 miles east of Gatzmer, as shown by Map II. The following mines and prospects were observed:

### Davis Coal & Coke Company No. 23 New (Pendleton Run) Mine—No. 20 on Map II.

On east side of Pendleton Creek, 1.9 miles northwest of Thomas; Bakerstown (Thomas) Coal; elevation, 3097′ L.

Section in room off third Right Heading of main heading:

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Draw slate | | | | |
| 2. | Coal, bony | 0′ | 3″ | | |
| 3. | Coal, soft | 0 | 6 | | |
| 4. | Coal, bony | 0 | 2 | | |

XIV.—Looking down Cheat River from sharp turn of Parsons-St. George road showing Holly Meadows with low terraces at left. Topography of Chemung Series.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 5. | Coal, soft | 1′ | 2″ | | |
| 6. | Slate, bony | 0 | 3½ | | |
| 7. | Coal, bony | 0 | 8½ | | |
| 8. | Coal, soft | 2 | 0 | | |
| 9. | Slate, dark | 0 | 1 | | |
| 10. | Coal, soft | 0 | 10 | 6 | 0 |
| 11. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 300 tons; 50 miners and 15 laborers employed; electric haulage; coal shipped east for by-product coke manufacture; butts, N. 45° W.; faces, S. 45° W.; greatest rise, southeast; sample (No. 397R) collected in room off Third Right Heading from Nos. 3, 5, 8, and 10 of section by D. B. Reger; Matthew Blair, Assistant General Superintendent, authority for mine data."

The composition of the above sample is published under Mine No. 20 in the Table of Coal Analyses at the end of this Chapter. Coal from the above opening, which is an extension of the "Thomas Drift", is hauled through the hill to the Thomas tipple, there being no railroad at the mine mouth.

### Davis Coal & Coke Company Prospect—No. 21 on Map II.

On north side of Beaver Creek, 1 mile northeast of Davis; Bakerstown (Thomas) Coal; elevation, 3195′ B.

Fallen shut; some coal on dump; thickness unknown.

### Davis Coal & Coke Company No. 29 Mine—No. 22 on Map II.

On Lost Run of Beaver Creek, 2 miles northeast of Davis; Bakerstown (Thomas) Coal; elevation, 3135′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Draw slate | | | | |
| 2. | Coal, soft | 0′ | 8″ | | |
| 3. | Bone | 0 | 1½ | | |
| 4. | Coal, soft | 0 | 5 | | |
| 5. | Coal, bony | 0 | 3½ | | |
| 6. | Coal, soft | 0 | 10 | | |
| 7. | Slate, bony | 0 | 2 | | |
| 8. | Coal, soft | 2 | 7 | 5 | 1 |
| 9. | Shale, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 225 tons when in operation; electric haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, southeast; faces, northeast; greatest rise, southeast; sample (No. 393R) collected on Main "A" Heading from Nos. 2, 4, 6, and 8 of section by D. B. Reger; Matthew Blair, Assistant General Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 22** in the Table of Coal Analyses at the end of this Chapter.

## Davis Coal & Coke Company No. 29½ Mine—No. 23 on Map II.

On Lost Run of Beaver Creek, 2 miles northeast of Davis; **Bakerstown (Thomas) Coal**; elevation, 3140′ L.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive, **Saltsburg** | | | | |
| 2. | **Coal**, soft | 0′ | 5 ″ | | |
| 3. | Slate, bony | 0 | 1½ | | |
| 4. | **Coal**, soft | 0 | 3½ | | |
| 5. | **Coal**, bony | 0 | 3 | | |
| 6. | **Coal**, soft | 1 | 5 | | |
| 7. | Slate, dark | 0 | 2½ | | |
| 8. | **Coal**, soft | 2 | 10½ | | 5 | 9 |
| 9. | Shale, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 200 tons when in operation; electric haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, southeast; faces, northeast; greatest rise, southeast; sample (No. 392R) collected from Nos. 2, 4, 6, and 8 of section in Main Heading, 1500 feet from mine mouth, by D. B. Reger; Matthew Blair, Assistant General Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 23** in the Table of Coal Analyses at the end of this Chapter.

## Davis Coal & Coke Company Prospect—No. 24 on Map II.

On north side of Beaver Creek, 2 miles northeast of Davis; **Bakerstown (Thomas) Coal**; elevation, 3150′ B.

Fallen shut, thickness unknown.

## Davis Coal & Coke Company Mine—No. 25 on Map II.

On Chaffey Run of Beaver Creek, 2.5 miles northeast of Davis; **Bakerstown (Thomas) Coal**; elevation, 3135′ B.

Fallen shut, thickness unknown.

### *Quantity of Bakerstown (Thomas) Coal Available.*

The following table, compiled by Tucker from a planimetric measurement of the outcrop on Map II, shows the probable amount of Bakerstown (Thomas) Coal in the county:

Probable Amount of Bakerstown (Thomas) Coal.

| Tucker County by Districts. | Thickness of Coal Assumed. Feet. | Square Miles. | Acres. | Cubic Feet of Coal. | Short Tons of Coal. (2000 Lbs.). |
|---|---|---|---|---|---|
| Fairfax | 5 | 12.00 | 7,680 | 1,672,704,000 | 66,908,160 |
| Davis | 3½ | 7.75 | 4,960 | 756,201,600 | 30,248,064 |
| Black Fork | 2 | 0.025 | 16 | 1,393,920 | 55,757 |
| Dry Fork | 2 | 6.25 | 4,000 | 348,480,000 | 13,939,200 |
| Totals | ...... | 26.025 | 16,656 | 2,778,779,520 | 111,151,181 |

In the above table an allowance has been made for the impurities of the bed and its absence in certain localities, as shown by core tests. No figures are available to show the amount of coal which has been mined but probably not more than two-thirds of the original coal in Fairfax and Davis Districts still remain. If such an estimate be accepted then the amount of coal at present available is, in round numbers, approximately 78,750,000 short tons.

## MINABLE COALS OF THE ALLEGHENY SERIES.

### UPPER FREEPORT (DAVIS) COAL.

The Upper Freeport (Davis) Coal, previously described in Chapter VI, pages 181-182, which, as therein explained, has long been erroneously known as the Lower Kittanning Coal in Tucker County, is a valuable bed of fuel in portions of Fairfax, Davis, and Dry Fork Districts, and also outcrops in a few mountain summits in Black Fork District. As exposed at mines and prospects and revealed by core tests it usually varies from 5 to 8 feet in thickness, being sometimes absent in restricted localities, there being an area of this sort just northeast of Davis where it is very patchy. In Fairfax and Davis Districts it has been mined extensively by drift and slope at numerous points. In this region it contains two or three bands of slate or shale, the good coal between them being so soft that it is recovered by pick mining without the aid of machine cutting. In chemical quality it is low in sulphur and volatile matter, and usually, but not always, low in ash, its phosphorus content in most cases being medium-high. For many years it was coked extensively in the vicinity of Douglas and Coketon, but the output of the region now is mostly shipped east for steam fuel or by-product coke manufacture. Its outcrop is delineated on Map II and Figure 10 shows its areal extent.

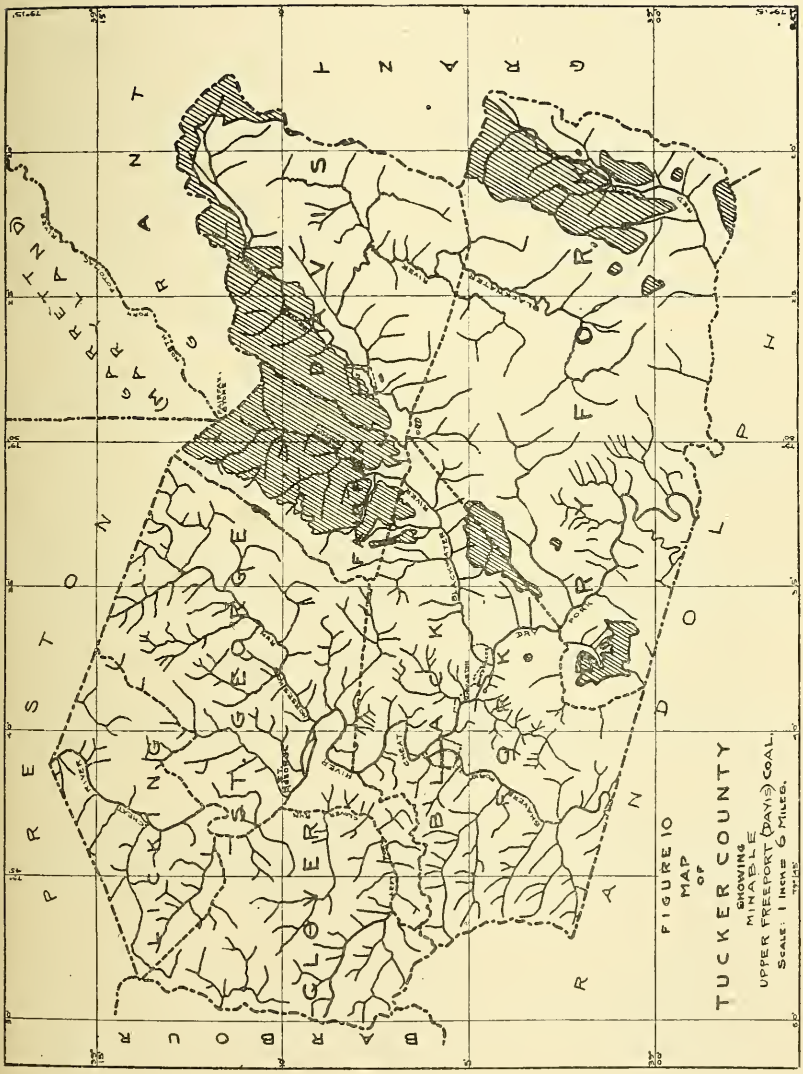

FIGURE 10
MAP
OF
TUCKER COUNTY
SHOWING
MINABLE
UPPER FREEPORT (DAVIS) COAL.
SCALE: 1 INCH = 6 MILES.

## *Upper Freeport (Davis) Coal, Black Fork District.*

In Black Fork District, the horizon of the Upper Freeport (Davis) Coal outcrops only in certain high summits southwest of Douglas and in the tops of Canaan and McGowan Mountains, as shown by Map II. So far as known it has not been prospected in these latter two localities, but it is believed that a search would reveal it, although an attempt to mine it would be expensive, owing to the rough topography and to the long inclines required. In the region southwest of Douglas there are no commercial mine openings but the following prospects were observed:

### Cumberland Coal Company Prospect—No. 30 on Map II.

On east side of Tub Run of Blackwater River, 1.8 miles southwest of Douglas; Upper Freeport (Davis) Coal; elevation, 3165′ B.

Fallen shut, thickness unknown.

### Cumberland Coal Company Prospect—No. 31 on Map II.

On east side of Tub Run of Blackwater River, 1.7 miles southwest of Douglas; Upper Freeport (Davis) Coal; elevation, 3125′ B.

Fallen shut, thickness unknown.

### Cumberland Coal Company Prospect—No. 32 on Map II.

On east side of Tub Run of Blackwater River, 1.7 miles southwest of Douglas; Upper Freeport (Davis) Coal; elevation, 3125′ B.

Fallen shut, thickness unknown.

### Cumberland Coal Company Exposure—No. 33 on Map II.

On north side of Blackwater River, 1.7 miles southwest of Douglas; Upper Freeport (Davis) Coal; elevation, 3150′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Soil | | | | |
| Coal | 0′ | 6″ | | |
| Shale, gray | 1 | 9 | | |
| Coal, soft, columnar | 3 | 7 | | |
| Shale, dark | 0 | 9 | | |
| Coal | 0 | 4 | | |
| Shale, dark | 0 | 5 | | |
| Coal | 1 | 9 | 9 | 1 |
| Shale, gray, pavement | | | | |

The above exposure is at the end of the 10th Left Air-course of the Cumberland Coal Company No. 1 mine located near Douglas, the same having been driven through to the outcrop.

### Cumberland Coal Company Prospect—No. 34 on Map II.

On north side of Blackwater River, 1.5 miles southwest of Douglas; **Upper Freeport (Davis) Coal**: elevation, 3140′ B.
Fallen shut, thickness unknown.

### Cumberland Coal Company Mine—No. 35 on Map II.

On north side of Blackwater River, 1.3 miles southwest of Douglas; **Upper Freeport (Davis) Coal**; elevation, 3130′ B.
Fallen shut, thickness unknown.

## *Upper Freeport (Davis) Coal, Fairfax District.*

In Fairfax District the Upper Freeport (Davis) Coal is found along the North Potomac Syncline, its outcrop on the western flank extending from the Preston County Line southwestward along the eastern foot-hills of Backbone Mountain. Along North Fork of Blackwater River, near the center of the basin, it rises above drainage just above Coketon, and affords the opportunity for drift mining in that vicinity and at Douglas. East of the latter point the outcrop extends to Pendleton Creek, going under drainage near Francis. The following mines and prospects were noted:

### Cumberland Coal Company Prospect—No. 36 on Map II.

On Tub Run of Blackwater River, 1.6 miles west of Douglas; **Upper Freeport (Davis) Coal**; elevation, 3135′ B.
Fallen shut, thickness unknown.

### Cumberland Coal Company Prospect—No. 37 on Map II.

On the head of Tub Run of Blackwater River, 1.7 miles westward from Douglas; **Upper Freeport (Davis) Coal**; elevation, 3190′ B.
Fallen shut, thickness unknown.

### Cumberland Coal Company No. 1 Mine—No. 38 on Map II.

On west side of North Fork, 0.3 mile southwest of Douglas; **Upper Freeport (Davis) Coal**; elevation, 2998′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Draw slate | | | | |
| 2. Coal, soft | 3′ | 6½″ | | |
| 3. Shale, dark | 0 | 7 | | |
| 4. Coal | 0 | 4 | | |
| 5. Shale, dark | 0 | 7 | | |
| 6. Coal, soft | 1 | 4½ | 6 | 5 |
| 7. Slate, pavement | | | | |

"Principal office, 900 Continental Building, Baltimore, Maryland; daily capacity, 400 tons; 65 miners and 40 laborers employed; electric and horse haulage; coal shipped east for steam fuel, west for blacksmithing and also coked locally; butts, S. 4° E.; faces, N. 86° E.; greatest rise, southwest; sample (No. 402R) collected from Nos. 2 and 6 of section in Fourth Right Heading by D. B. Reger; J. J. Dobbie, Superintendent, authority for mine data."

The composition of the above sample is published under Mine No. 38 in the Table of Coal Analyses at the end of this Chapter.

### Cumberland Coal Company Prospect—No. 39 on Map II.

On North Fork just west of Douglas; Upper Freeport (Davis) Coal; elevation, 2950′ B.

Fallen shut, thickness unknown.

### Cumberland Coal Company Nos. 3 and 4 Mines—No. 40 on Map II.

On south side of Long Run of North Fork, 0.6 mile west of Douglas; Upper Freeport (Davis) Coal; elevation, 3005′ B.

Abandoned and fallen shut.

### Cumberland Coal Company No. 6 Mine—No. 41 on Map II.

On north side of Long Run of North Fork, 0.7 mile west of Douglas; Upper Freeport (Davis) Coal; elevation, 3000′ B.

Abandoned and fallen shut.

### Cumberland Coal Company No. 5 Mine—No. 42 on Map II.

On south side of Long Run of North Fork, 0.8 mile west of Douglas; Upper Freeport (Davis) Coal; elevation, 3010′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Sandstone, massive, Lower Mahoning | | | 50 | 0 |
| Shale, gray | | | 2 | 0 |
| Coal, soft | 1′ | 6″ | | |
| Slate, dark | 0 | 3 | | |
| Coal, soft | 1 | 2 | | |

| | | | | | Ft. | In. |
|---|---|---|---|---|---|---|
| Slate, dark | 0′ | 2″ | | | | |
| Coal, soft | 1 | 10 | 4′ | 11″ | | |
| Shale, gray | | | 1 | 6 | | |
| Coal | 0 | 3 | | | | |
| Slate, dark | 0 | 3 | | | | |
| Coal, soft | 1 | 10 | | | | |
| Slate, black, bony | 0 | 2 | | | | |
| Coal | 0 | 3 | | | | |
| Slate, black | 0 | 1½ | | | | |
| Coal | 0 | 3½ | 3 | 2 | 9 | 7 |
| Fire clay shale, to creek | | | | | 2 | 0 |

The above mine has been abandoned but a full section of the coal is revealed at the mouth of the entry.

### Cumberland Coal Company Exposure—No. 43 on Map II.

On Long Run of North Fork, 1.4 miles northwest of Douglas; **Upper Freeport (Davis) Coal**; elevation, 3120′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Sandstone, massive, Lower Mahoning | | | | |
| Coal | 0′ | 2″ | | |
| Shale, sandy | 0 | 3 | | |
| Coal | 0 | 6 | | |
| Shale, gray | 0 | 3 | | |
| Coal, soft, columnar | 3 | 6 | 4 | 8 |

The above opening is a portion of the Cumberland No. 5 mine, having been driven to the surface half a mile up Long Run above the main entry.

### Cumberland Coal Company No. 2 Mine—No. 44 on Map II.

On east side of North Fork, 0.6 mile southeast of Douglas; **Upper Freeport (Davis) Coal**; elevation, 3037′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Draw slate | | | | |
| 2. Coal, soft | 3′ | 8½″ | | |
| 3. Shale, gray | 0 | 6 | | |
| 4. Coal | 0 | 4 | | |
| 5. Shale, gray | 0 | 4 | | |
| 6. Coal | 1 | 10½ | 6 | 9 |
| 7. Slate, pavement | | | | |

"Principal office, 900 Continental Building, Baltimore, Maryland; daily capacity, 200 tons; 30 miners and 20 laborers employed; electric and horse haulage; coal shipped east for steam fuel, west for smith-ing, and also coked locally; butts, S. 80° E.; faces, N. 10° E.; greatest rise, southwest; sample (No. 400R) collected from Nos. 2 and 6 of section in Third Right Heading by D. B. Reger; J. J. Dobbie, Superintendent, authority for mine data."

The composition of the above sample is published under Mine No. 44 in the Table of Coal Analyses at the end of this Chapter.

The Cumberland Coal Company had 28 bee-hive coke ovens in blast at the time of the writer's visit (May, 1919), using a portion of the product of their Nos. 1 and 2 mines, there being an output of 50 tons per day, mostly 72-hour coke, used largely for foundry purposes. Thirty men are employed on the coke yard, tipple, and other outside activities. A sample (No. 402R) of 72-hour coke gives the following analysis, according to Hite and Krak:

| Proximate. | Per cent. |
|---|---|
| Moisture | 0.41 |
| Volatile Matter | 2.79 |
| Fixed Carbon | 87.71 |
| Ash | 9.09 |
| Total | 100.00 |
| Sulphur | 0.87 |
| Phosphorus | 0.039 |

| Ultimate. | Per cent. |
|---|---|
| Carbon | 88.48 |
| Hydrogen | 0.34 |
| Oxygen | 0.41 |
| Nitrogen | 0.81 |
| Sulphur | 0.87 |
| Ash | 9.09 |
| Total | 100.00 |
| Calculated B. T. U. | 13,080 |

## Cumberland Coal Company Prospect—No. 45 on Map II.

On a short branch of North Fork, 0.6 mile southeast of Douglas; **Upper Freeport (Davis) Coal**; elevation, 3025' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, dark | | | | |
| **Coal**, soft | 3' | 9" | | |
| Sandstone or shale | 0 | 9 | | |
| **Coal** | 0 | 4½ | | |
| Shale, dark | 0 | 7 | | |
| **Coal** | 2 | 3½ | 7 | 9 |
| Pavement (?) | | | | |

## Cumberland Coal Company Prospect—No. 46 on Map II.

On a short branch of North Fork, 0.7 mile southeast of Douglas; **Upper Freeport (Davis) Coal**; elevation, 3025' B.

| | Ft. | In. |
|---|---|---|
| Shale, dark | | |

| | | | Ft. | In. |
|---|---|---|---|---|
| Coal | 0′ | 7½″ | | |
| Slate, dark | 0 | 2½ | | |
| Coal | 3 | 9 | | |
| Shale, gray | 0 | 7 | 5 | 2 |
| Coal, not taken up, thickness concealed | | | | |

## Davis Coal & Coke Company No. 36 Mine—No. 47 on Map II.

On east side of North Fork, 0.3 mile south of Coketon; Upper Freeport (Davis) Coal; elevation, 2912′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Draw slate | | | | |
| 2. Coal, roof | 0′ | 10″ | | |
| 3. Coal, soft | 1 | 11 | | |
| 4. Slate, bony | 1 | 4 | | |
| 5. Coal, soft | 3 | 7 | 7 | 8 |
| 6. Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 35 tons; 8 miners and 9 laborers employed; electric haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, northwest; faces, southwest; greatest rise, southeast; sample (No. 395R) collected from Nos. 3 and 5 of section in room near face of Ryan Heading by D. B. Reger; J. P. Phillips, Mine Clerk, authority for mine data."

The composition of the above sample is published under Mine No. 47 in the Table of Coal Analyses at the end of this Chapter.

## Davis Coal & Coke Company No. 37 Mine—No. 48 on Map II.

On west side of North Fork, 0.2 mile southwest of Coketon; Upper Freeport (Davis) Coal; elevation, 2889′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Draw slate | | | | |
| 2. Coal | 0′ | 11″ | | |
| 3. Slate, gray | 0 | 4 | | |
| 4. Coal, soft | 2 | 2 | | |
| 5. Slate, dark | 0 | 4 | | |
| 6. Coal, soft | 3 | 8 | 7 | 5 |
| 7. Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 750 tons; 98 miners and 45 laborers employed; electric haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, northwest; faces, southwest; greatest rise, northwest: sample (No. 396R) collected from Nos. 4 and 6 of section in Second Left off Seventh North Heading by D. B. Reger; Hubert Elrick, Weighmaster, authority for mine data."

The composition of the above sample is published under Mine No. 48 in the Table of Coal Analyses at the end of this Chapter.

## Davis Coal & Coke Company No. 35 Mine—No. 49 on Map II.

On east side of North Fork just southeast of Coketon; **Upper Freeport (Davis) Coal**; elevation, 2882′ L.
Abandoned and fallen shut.

## Davis Coal & Coke Company Mine—No. 50 on Map II.

On east side of North Fork just east of Coketon; **Upper Freeport (Davis) Coal**; elevation 2865′ B.
Abandoned and fallen shut.

The above opening, which is now abandoned and fallen shut, is the last exposure going up North Fork, the base of the coal being only 5 feet above drainage.

## Davis Coal & Coke Company No. 38 Mine—No. 51 on Map II.

On Snyder Run of North Fork at Benbush; **Upper Freeport (Davis) Coal**, elevation, 2808′ L.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive | | | | |
| 2. | Draw slate, 0′ to | | | 3 | 0 |
| 3. | **Coal, bony** | 0′ | 5″ | | |
| 4. | **Coal, soft, columnar** | 1 | 10 | | |
| 5. | Slate, dark | 0 | 2 | | |
| 6. | **Coal, soft, columnar** | 3 | 4 | 5 | 9 |
| 7. | Shale, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 400 tons; 80 miners and 61 laborers employed; electric and mule haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, N. 43° W.; faces, N. 47° E.; greatest rise, northwest; sample (No. 388R) collected from Nos. 4 and 6 of section in First Left off Second Right (Cooper) Heading by D. B. Reger; Benjamin Mister, Mine Clerk, authority for mine data."

The composition of the above sample is published under Mine No. 51 in the Table of Coal Analyses at the end of this Chapter. The above mine is a shaft operation, the depth being 173 feet.

## Davis Coal & Coke Company No. 34 Mine—No. 52 on Map II.

On North Fork of Blackwater River at Thomas; Upper Freeport (Davis) Coal; elevation, 2802′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Sandstone, massive, Lower Mahoning | | | .. | .. |
| 2. Draw slate, 0′ to | | | 2 | 0 |
| 3. Coal, bony | 0′ | 5″ | | |
| 4. Coal, soft, columnar | 3 | 3 | | |
| 5. Shale, gray | 1 | 6 | | |
| 6. Coal, medium-soft | 1 | 6 | 6 | 8 |
| 7. Concealed | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 200 tons; 38 miners and 30 laborers employed; electric haulage; coal shipped east for steam fuel and by-product coke manufacture; butts, N. 18° W.; faces, N. 72° E.; greatest rise, southwest; sample (No. 389R) collected from No. 4 of section in Third Right off Blair Heading by D. B. Reger; Matthew Blair, Assistant General Superintendent, authority for mine data."

The composition of the above sample is published under Mine No. 52 in the Table of Coal Analyses at the end of this Chapter. The above mine is a shaft operation that has been active for many years, the depth being 186 feet. The section varies somewhat throughout the mine, the following measurement having been made in the main haulage way:

| | | | Ft. | In. |
|---|---|---|---|---|
| Draw slate, visible | | | 8 | 0 |
| Coal | 1′ | 5 ″ | | |
| Slate, dark | 0 | 1½ | | |
| Coal | 1 | 3½ | | |
| Slate, dark | 0 | 1 | | |
| Coal | 3 | 4 | | |
| Shale, gray | 1 | 6 | | |
| Coal, visible | 0 | 6 | 8 | 3 |

## Davis Coal & Coke Company No. 39 Mine—No. 53 on Map II.

On Sand Run of North Fork, just southeast of Pierce; Upper Freeport (Davis) Coal; elevation, 2580′ L.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Sandstone, massive, Lower Mahonnig | | | .. | .. |
| 2. Draw slate, reported | | | 1 | 0 |
| 3. Coal, bony, reported | 0′ | 6 ″ | | |
| 4. Coal, soft, columnar | 2 | 0½ | | |
| 5. Slate, dark, 0′ 1″ to | 0 | 1½ | | |
| 6. Coal, soft, columnar | 3 | 3 | 5 | 11 |
| 7. Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 600 tons; 106 miners and 38 laborers employed; electric haulage; coal shipped east, mainly for by-product coke manufacture; butts, N. 10° W.; faces, N. 80° E.; greatest rise, northwest; sample (No. 385R) collected from Nos. 4 and 6 of section in Room No. 4 off Fifth Left by D. B. Reger; H. H. Harrison, Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 53** in the Table of Coal Analyses at the end of this Chapter. The above mine is a shaft operation, installed in recent years, the depth being 426 feet.

## Davis Coal & Coke Company No. 40 Mine—No. 54 on Map II.

On Sand Run of North Fork, just northwest of Pierce; **Upper Freeport (Davis) Coal**; elevation, 2799′ L.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive, **Lower Mahoning** | | | .. | .. |
| 2. | Draw slate | | | 1 | 0 |
| 3. | **Coal**, bony | 0′ | 8″ | | |
| 4. | **Coal**, soft, good, columnar | 2 | 1 | | |
| 5. | Slate, black | 0 | 1½ | | |
| 6. | **Coal**, soft, columnar | 3 | 0½ | 5 | 11 |
| 7. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 500 tons; 86 miners and 86 laborers employed: electric haulage; coal shipped east, mainly for by-product coke manufacture; butts, N. 10° W.; faces, N. 80° E.; greatest rise, northwest; sample (No. 384R) collected from Nos. 4 and 6 of section in Room No. 25 off Main North Entry by D. B. Reger; H. H. Harrison, Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 54** in the Table of Coal Analyses at the end of this Chapter. The above mine is a shaft operation, recently installed, the depth being 240 feet.

## Davis Coal & Coke Company No. 43 Mine—No. 55 on Map II.

On the head of Sand Run of North Fork, 1.1 miles northwest of Pierce; **Upper Freeport (Davis) Coal**; elevation, 3184′ L.

| | | | | Ft | In. |
|---|---|---|---|---|---|
| 1. | Draw slate, reported 6′ to | | | 10 | 0 |
| 2. | **Coal**, medium-soft | 0′ | 3″ | | |
| 3. | **Coal**, bony | 0 | 3 | | |
| 4. | Slate, dark | 0 | 2 | | |
| 5. | **Coal**, bony | 0 | 3 | | |

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 6. | Coal, soft | 2′ | 1½″ | | |
| 7. | Slate, dark | 0 | 1½ | | |
| 8. | Coal, soft | 2 | 9 | 5 | 11 |
| 9. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 500 tons; 53 miners and 38 laborers employed; cable and electric haulage; coal shipped east for by-product coke manufacture; sample (No. 386R) collected from Nos. 6 and 8 of section in main entry between Fourth and Fifth Left by D. B. Reger; H. H. Harrison, Superintendent, authority for mine data."

The composition of the above sample is published under **Mine No. 55** in the Table of Coal Analyses at the end of this Chapter. This mine is a recently installed slope operation, located near the western outcrop of the coal.

### Davis Coal & Coke Company Exposure—No. 56 on Map II.

On Glade Run of North Fork, 1.2 miles northward from Pierce; **Upper Freeport (Davis) Coal**; elevation, 3105′ B.
Coal only partly exposed at air-hole of Mine No. 43 (No. 55 on Map II).

### Davis Coal & Coke Company No. 42 Mine—No. 57 on Map II.

On North Branch of Potomac River at Kempton; **Upper Freeport (Davis) Coal**; elevation, 2306′ L.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Draw slate, reported | | | 2 | 0 |
| 2. | Coal, bony, soft, reported | 0′ | 2″ | | |
| 3. | Coal, soft, columnar | 2 | 0½ | | |
| 4. | Slate, black | 0 | 2 | | |
| 5. | Coal, soft, columnar | 3 | 0½ | 5 | 5 |
| 6. | Slate, pavement | | | | |

"Principal office, Continental Trust Building, Baltimore, Maryland; daily capacity, 700 tons; 103 miners and 95 laborers employed; electric haulage; coal shipped east for by-product coke manufacture; greatest rise, northwest; sample (No. 387R) collected from Nos. 3 and 5 of section in E-1 Heading off Main Entry, 4500 feet from shaft bottom by D. B. Reger; R. S. Taylor, Mine Clerk, authority for mine data."

The composition of the above sample is published under **Mine No. 57,** in the Table of Coal Analyses at the end of this Chapter. The above shaft, the depth of which is 420 feet, is located in Garrett County, Maryland, but part of its operation extends toward Tucker County and affords valuable data on the coal in the vicinity of Fairfax Knob. The entire section of the coal is not mined at the point where the sample was taken, as shown by the following measurement in the Main Heading about 75 feet above Main "B":

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Draw slate | | | | |
| 2. | Coal, bony | 0′ | 2″ | | |
| 3. | Coal, soft, columnar | 1 | 10 | | |
| 4. | Slate, dark | 0 | 2 | | |
| 5. | Coal, soft, columnar | 3 | 1 | | |
| 6. | Shale, gray | 1 | 6 | | |
| 7. | Coal | 0 | 1½ | | |
| 8. | Slate, bony | 0 | 6 | | |
| 9. | Coal, soft | 2 | 2 | | |
| 10. | Shale, gray | 0 | 1½ | | |
| 11. | Coal | 1 | 0 | 10 | 8 |
| 12. | Slate, pavement | | | | |

From a comparison of the two sections it is evident that the first 6 members of each measurement are identical.

### *Upper Freeport (Davis) Coal, Davis District.*

In Davis District the Upper Freeport (Davis) Coal is present along a comparatively narrow fringe next to Grant County and mainly north of Beaver Creek, its outcrop starting at Pendleton Creek, 1½ miles westward from Davis, and passing generally northeastward through Davis, crossing Beaver Creek about 2½ miles above the town, there being two comparatively small areas south of the creek. One-half mile west of Gatzmer its outcrop crosses to the north side, follows around the headwaters of the stream and passes into Grant County near the extreme head. It has been mined at several localities, the following openings and prospects having been noted:

#### Davis Coal & Coke Company Mine—No. 58 on Map II.

On Davis Branch of Western Maryland Railway, just north of Francis; Upper Freeport (Davis) Coal; elevation, 3065′ B.

Fallen shut, thickness concealed.

The above opening has been abandoned, the same being an entry of the Davis Coal & Coke Company No. 41 mine.

## Davis Coal & Coke Company No. 41 Mine—No. 59 on Map II.

Along Davis Branch of Western Maryland Railway, at Francis; Upper Freeport (Davis) Coal; elevation, 3085′ L.
Abandoned and fallen shut.

The above opening is the main entry of Davis No. 41, the entire plant having now been removed.

## Blackwater Coal Company Mine—No. 60 on Map II.

Along Davis Branch of Western Maryland Railway, just west of Davis; Upper Freeport (Davis) Coal; elevation, 3110′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, Lower Mahoning | | | | |
| 2. | Draw slate, reported | | | 1 | 0 |
| 3. | Coal, soft | 3′ | 9″ | | |
| 4. | Shale, gray, with streaks of coal | 1 | 7 | | |
| 5. | Coal, soft | 1 | 7 | | |
| 6. | Slate, dark | 0 | 1 | | |
| 7. | Coal, soft | 1 | 7 | 8 | 7 |
| 8. | Shale, pavement | | | | |

"Principal office, Thomas, W. Va.; daily capacity, 125 tons; 27 miners and 13 laborers employed; horse haulage; coal used mainly in Davis for steam and domestic fuel; butts, east and west; faces, north and south; greatest rise, southeast; sample (No. 398R) collected from No. 3 (upper bench), and sample (No. 399R) from Nos. 5 and 7 (lower bench) of section in Room No. 2 off Cooper Heading by D. B. Reger; Riley Walters, Assistant Mine Foreman, authority for mine data."

The compositions of the above samples are published under Mine No. 60 in the Table of Coal Analyses at the end of this Chapter.

## Coal Exposure—No. 61 on Map II.

On north side of Blackwater River, just west of Davis, and near tannery; Upper Freeport (Davis) Coal; elevation, 3125′ B.
Fallen shut, thickness unknown.

## Coal Blossom—No. 62 on Map II.

In city street, western edge of Davis; Upper Freeport (Davis) Coal; elevation, 3145′ B.
At base of sandstone quarry, thickness unknown.

### Coal Prospect—No. 63 on Map II.

On north side of Beaver Creek, 0.6 mile northeast of Davis; **Upper Freeport (Davis) Coal**; elevation, 3125' B.
Fallen shut, thickness unknown.

On Beaver Creek above Davis two attempts have been made to mine the coal, both of which have now been abandoned. At the old Beacon plant, located on land now owned by Herr & Company, the entry has fallen shut and the tipple is in ruins, the following partial section having been secured by descending the old air-shaft:

### Beacon Coal & Coke Company Mine—No. 64 on Map II.

On south side of Beaver Creek, 1.5 miles southwest of Gatzmer; **Upper Freeport (Davis) Coal**; elevation, 3150' B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Concealed by timbers | | | 15 | 0 |
| 2. | Sandstone, massive | | | 10 | 0 |
| 3. | Draw slate | | | 10 | 0 |
| 4. | Slate, cannel | | | 1 | 0 |
| 5. | **Coal, soft, columnar** | 3' | 6" | | |
| 6. | Slate, bony | 1 | 9 | | |
| 7. | **Coal, concealed by water** and mud, approximately | 2 | 0 | 7 | 3 |

A sample (No. 404R) was collected from No. 5 of section, the composition of which is published under **Mine No. 64** in the Table of Coal Analyses at the end of this Chapter.

In the year 1908 the following section of the mine was measured by C. H. Leps, at the instance of the Davis Coal & Coke Company:

| | | | Ft. | In. |
|---|---|---|---|---|
| Roof, poor | | | | |
| **Top coal** | 2' | 10" | | |
| Rock (probably bony slate) | 1 | 4 | | |
| **Bottom coal** | 2 | 8 | 6 | 10 |
| Fire clay, pavement | | | | |

### Gatzmer Coal & Coke Company Prospect—No. 65 on Map II.

On south side of Beaver Creek, 0.6 mile southwest of Gatzmer; **Upper Freeport (Davis) Coal**; elevation, 3170' B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive, Lower Mahoning........ | | | | |
| 2. | Shale, dark................................ | | | | |
| 3. | Coal, soft................ | 3′ | 8″ | | |
| 4. | Slate, bony.............. | 1 | 2 | | |
| 5. | Coal, soft................ | 1 | 10 | | |
| 6. | Sulphur band............ | 0 | 1 | | |
| 7. | Coal, soft................ | 2 | 6 ........... | 9 | 3 |
| 8. | Slate, pavement............................ | | | | |

A sample (No. 405R) was collected from Nos. 3, 5, and 7 of section, the composition of which is published under Mine No. 65 in the Table of Coal Analyses at the end of this Chapter.

### Gatzmer Coal & Coke Company Mine—No. 66 on Map II.

On north side of Beaver Creek, at Gatzmer; Upper Freeport (Davis) Coal; elevation, 3230′ B.
Abandoned and full of water.

The above mine was once a commercial plant but has now been abandoned, the railroad line, tributary to the Western Maryland at Dobbin, which served it, having been taken up. According to S. B. Jeffries, Chief Engineer, Davis Coal & Coke Company, there are two benches of coal, the upper being 2½ feet and the lower 3½ feet thick, the nature of the parting between them not being recorded. The following analyses were secured by the Davis Company in 1909, presumably from the two benches:

| | First Sample. Per cent. | Second Sample. Per cent. |
|---|---|---|
| Moisture ............................ | 0.75 | 0.62 |
| Volatile Matter...................... | 16.35 | 18.29 |
| Fixed Carbon........................ | 71.69 | 71.79 |
| Ash ................................ | 11.21 | 9.30 |
| Totals ........................ | 100.00 | 100.00 |
| Sulphur ............................ | 2.35 | 2.21 |
| Phosphorus ........................ | ..... | 0.053 |

### *Upper Freeport (Davis) Coal, Dry Fork District.*

In Dry Fork District the Upper Freeport (Davis) Coal is present along a portion of the Stony River Basin, outcropping at the foot of the mountains on either side but being under drainage along the axis except in the region northeast of Laneville where the waters of Red Creek have cut through the plateau and exposed sediments far below its horizon. In most of this region information is very scanty, one of the four borings made having indicated a good thickness of coal, two of them having shown less than two feet, and the fourth not having reached its horizon. In Tucker County only one opening has been made, so far as known, but north of the line, in Grant County, it has been prospected and also core tested by the Davis Coal and Coke Company. The records of these various tests, which the writer has been permitted to inspect, reveal a fair thickness of coal at most points. In the Laneville region of Tucker, the following opening was made by Whitmer, Lane & Company when lumber operations were in progress in that locality:

### Robert Bridges Heirs Mine—No. 67 on Map II.

On the west side of Stonecoal Run of Red Creek, 3.2 miles northeast of Laneville; **Upper Freeport (Davis) Coal**; elevation, 3660' B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Shale, black | | | | |
| 2. | **Coal**, soft | 1' | 9" | | |
| 3. | Shale, gray | 1 | 4 | | |
| 4. | **Coal**, cannel bone | 1 | 10 | | |
| 5. | Shale, gray | 0 | 10 | | |
| 6. | **Coal**, soft | 1 | 3 | | |
| 7. | **Coal**, bony | 0 | 4 | | |
| 8. | **Coal**, soft | 0 | 10 | 8 | 2 |
| 9. | Shale, pavement | | | | |

A sample (No. 455R) was collected from Nos. 2, 6, and 8 of section, the composition of which is published under **Mine No. 67** in the Table of Coal Analyses at the end of this Chapter. The sample was taken near the mine mouth and its analysis reveals a high content of ash. There may be better coal farther underground but access could not be had into the old workings.

### *Quantity of Upper Freeport (Davis) Coal Available.*

The following table, compiled by Tucker from a planimetric measurement of the outcrop on Map II, shows the probable amount of Upper Freeport (Davis) Coal available in the county:

**Probable Amount of Upper Freeport (Davis) Coal.**

| Tucker County by Districts. | Thickness of Coal Assumed. Feet. | Square Miles. | Acres. | Cubic Feet of Coal. | Short Tons of Coal. (2000 Lbs.). |
|---|---|---|---|---|---|
| Black Fork | 3 | 1.90 | 1,216 | 158,906,880 | 6,356,275 |
| Fairfax | 5 | 18.70 | 11,968 | 2,606,630,400 | 104,265,216 |
| Davis | 3½ | 16.50 | 10,560 | 1,609,977,600 | 64,399,104 |
| Dry Fork | 3 | 16.60 | 10,624 | 1,388,344,320 | 55,533,773 |
| Totals | ...... | 53.70 | 34,368 | 5,763,859,200 | 230,554,368 |

In the above table an allowance has been made in the assumed thickness of the coal for the usual impurities and local absence of the bed, but none has been made for the coal already mined, exact figures not being available. In Black Fork, Davis, and Dry Fork Districts, this amount is negligible, as compared to the total, but in Fairfax it is believed that perhaps one-fourth has been removed. On this basis the total for the county would be reduced in round numbers to 205,000,000 short tons.

## MINABLE COALS OF THE POTTSVILLE SERIES.

In the Kanawha Group of the Pottsville Series all the coals known to occur in the county have been fully described in Chapter VII, together with bed sections and other data. It is not considered that any of these coals afford an opportunity for successful commercial mining.

In the New River Group there is one coal of wide persistence and fair thickness and quality from which it is believed that a considrable tonnage of commercial coal may be recovered.

## SEWELL (SHARON?) COAL.

The Sewell (Sharon?) Coal, previously discussed in Chapter VII, page 220, is a valuable bed of fuel in portions of Black Fork, Fairfax, Davis, and Dry Fork Districts. In Licking District its horizon occurs in the top of Limestone Mountain but the coal is probably too thin for mining. In St. George District it is present along a narrow strip just west of the summit of Backbone Mountain. In Clover District its horizon is above the topography. Its outcrop is delineated on Map II and on Figure 11 the areas where it is believed to be of minable thickness are indicated.

### *Sewell (Sharon?) Coal, Licking District.*

In Licking District the following prospect was noted near the top of Limestone Mountain, where the horizon of the Sewell (Sharon?) Coal outcrops in two localities which total not more than 200 to 300 acres:

#### Coal Prospect—No. 105 on Map II.

On southeast slope of Limestone Mountain, 1.9 miles southeast of Hannahsville; Sewell (Sharon?) Coal; elevation, 3040′ B.
Fallen shut, reported 1 foot thick.

In view of the thickness reported above, and from the fact that it is not of minable thickness in regions farther north, it is extremely doubtful whether any coal may be recovered from the two outcrops mentioned.

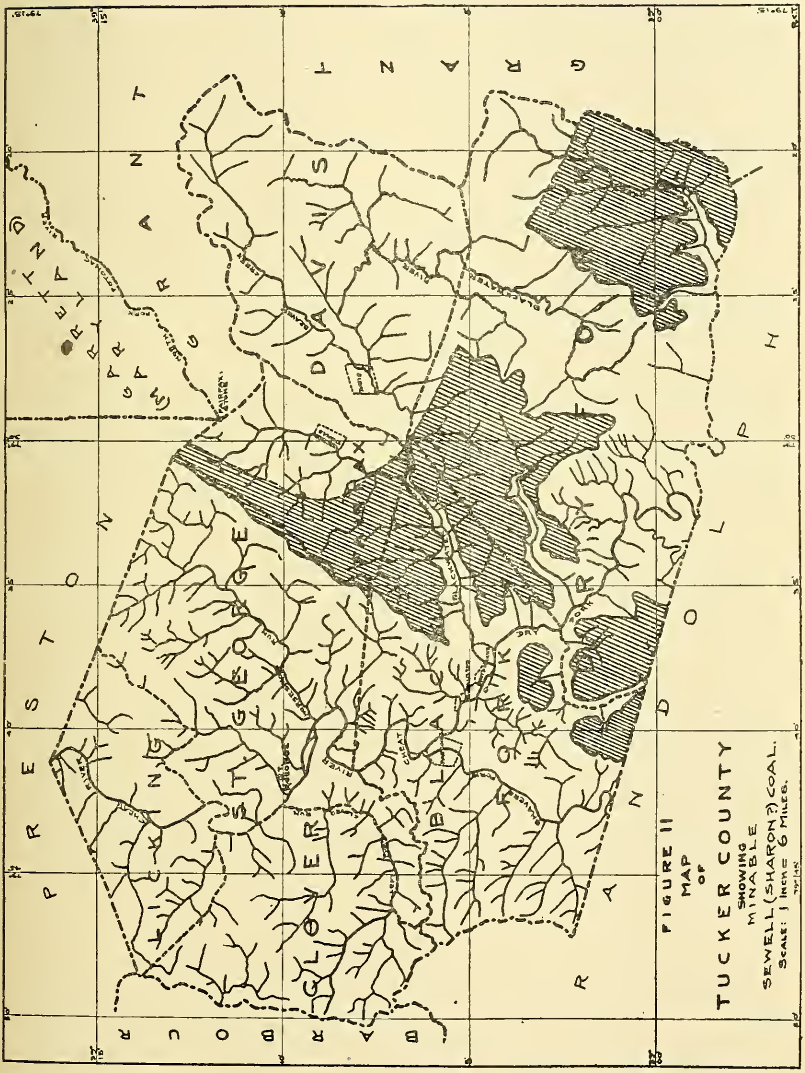


FIGURE 11
MAP
OF
TUCKER COUNTY
SHOWING
MINABLE
SEWELL (SHARON?) COAL.
SCALE: 1 INCH = 6 MILES.

### *Sewell (Sharon?) Coal, St. George District.*

In St. George District the Sewell (Sharon?) Coal outcrops along the western side of Backbone Mountain, near the summit there being an extremely narrow belt of coal, varying from one-eighth to one-half mile in width. Little prospecting has been done, the coal having been noted at only the two following localities:

#### Coal Blossom—No. 106 on Map II.

On west slope of Backbone Mountain, 1.8 miles northwest of Pierce; Sewell (Sharon?) Coal; elevation, 3105′ B.

Coal blossom, thickness unknown.

#### Davis Coal & Coke Company Prospect—No. 107 on Map II.

On west slope of Backbone Mountain, near head of a branch of Leadmine Run, 1.8 miles northwest of Pierce; Sewell (Sharon?) Coal; elevation, 3200′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Shale, dark, with plant fossils, Hartridge..... | | | | |
| 2. | Coal, soft................ | 2′ | 3″ | | |
| 3. | Slate, bony.............. | 1 | 7 | | |
| 4. | Coal, very soft........... | 1 | 9 ............ | 5 | 7 |
| 5. | Pavement? .................................. | | | | |

A sample (No. 424R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 107** in the Table of Coal Analyses at the end of this Chapter, the coal being low in sulphur but moderately high in ash, probably largely due to the fact that the sample was taken near the outcrop under slight cover and was badly weathered.

### *Sewell (Sharon?) Coal, Black Fork District.*

In Black Fork District the Sewell (Sharon?) Coal outcrops in Backbone, Canaan, and McGowan Mountains, being more than half way up toward the summits in every instance. It has been prospected at various points and usually shows a fair thickness and quality of coal. At one locality it was mined for a short time to use as fuel in burning limestone, but elsewhere, so far as known, no attempt has been made to utilize it, either for domestic or commercial coal, its position being so high on the mountains and their slopes so steep and rough that wagon or sled transportation is a practical impossibility and the long tramways required would be expensive. The following exposures and prospects were noted:

### Coal Blossom—No. 108 on Map II.

On west slope of Backbone Mountain near the head of a branch of Mill Run and 3.7 miles west of Douglas; Sewell (Sharon?) Coal; elevation, 3310′ B.

Coal blossom, thickness unknown.

### Babcock Lumber & Boom Company Prospect (Dobbin Manor Tract)—No. 109 on Map II.

On south side of Blackwater River, 2.4 miles east of Hendricks, Sewell (Sharon?) Coal; elevation, 2770′ B.

| | | Ft. | In. |
|---|---|---|---|
| Sandstone, massive, Lower Guyandot | | 30 | 0 |
| Coal, medium-soft | 2′ 11″ | | |
| Coal, slaty | 0 5 | 3 | 4 |
| Fire clay, shale, and concealed | | 10 | 0 |
| Sandstone, massive, Upper Raleigh (Sharon) visible | | 10 | 0 |
| Concealed and sandy shale, to red beds | | 25 | 0 |

### Babcock Lumber & Boom Company Prospect (Dobbin Manor Tract)—No. 110 on Map II.

On south side of Blackwater River, 3.4 miles eastward from Hendricks; Sewell (Sharon?) Coal; elevation, 2610′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. | Shale, dark, sandy, Hartridge | | 15 | 0 |
| 2. | Coal, soft | 2′ 9″ | | |
| 3. | Coal, slaty | 0 5 | 3 | 2 |
| 4. | Shale, pavement | | | |

A sample (No. 432R) was collected from No. 2 of section, the composition of which is published under Mine No. 110 in the Table of Coal Analyses at the end of this Chapter.

### Western Maryland Railway Exposure—No. 111 on Map II.

On north side of Blackwater River, 1.5 miles southeast of Douglas; Sewell (Sharon?) Coal; elevation, 2525′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. | Shale | | | |
| 2. | Coal, soft | 0′ 11″ | | |
| 3. | Coal, bony | 0 3 | 1 | 2 |
| 4. | Fire clay, shaly, with plant rootlets | | | |

A sample (No. 410R) was collected from No. 2 section, the composition of which is published under **Mine No. 111** in the Table of Coal Analyses at the end of this Chapter.

### J. P. Scott et al. Mine—No. 112 on Map II.

On east side of Dry Fork, 1.4 miles east of Hendricks; Sewell (Sharon?) Coal; elevation, 2740′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. | Sandstone | | | |
| 2. | Shale, sandy, with plant fossils at base, Hartridge | | 8 | 0 |
| 3. | Coal, medium-soft | 2′ 4″ | | |
| 4. | Slate, gray | 0 4 | | |
| 5. | Coal, bony | 1 4 | 4 | 0 |
| 6. | Shale, pavement | | | |

A sample (No. 414R) was collected from No. 3 of section, the composition of which is published under **Mine No. 112** in the Table of Coal Analyses at the end of this Chapter. The sample was taken near the mine mouth and shows a high percentage of ash. The above entry has often been referred to as the **Lime-Kiln Mine** from the fact that a chute was once constructed down the mountain to a lime-kiln on the railroad. Two analyses of the coal were made in 1912 by Smith, Rudy & Company for the Davis Coal & Coke Company, being reported as follows by S. B. Jeffries, Chief Engineer of the latter company:

| | Main Heading. Per cent. | Air-course. Per cent. |
|---|---|---|
| Moisture | 1.14 | 1.29 |
| Volatile Matter | 25.31 | 25.37 |
| Fixed Carbon | 61.75 | 62.03 |
| Ash | 11.80 | 11.31 |
| Totals | 100.00 | 100.00 |
| Sulphur | 0.48 | 0.44 |

Since the lime-kiln fell into disuse, the mine has been abandoned and the old chute is out of repair.

### Dobbin Manor Prospect—No. 113 on Map II.

On east side of Dry Fork, 1.2 miles northeast of Otter; Sewell (Sharon?) Coal, elevation, 2765' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Coal, reported | 1' | 8" | | |
| Slate, gray, reported | 1 | 6 | | |
| Coal, reported | 1 | 9 | 4 | 11 |

Mr. Adam Phillips, guide, is authority for the above section, the prospect having fallen shut.

### Adam Phillips Prospect—No. 114 on Map II.

On west side of Dry Fork, 1 mile northwest of Otter; Sewell (Sharon?) Coal; elevation, 2790' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Shale, dark, Hartridge | | | 10 | 0 |
| 2. Coal, good, reported | 3' | 6" | | |
| 3. Coal, slaty, reported | 0 | 6 | 4 | 0 |

Mr. Phillips is authority for the above section, the prospect having fallen shut. A sample (No. 427R) was collected from a clean stock pile that had lain on the dump 4 years, the composition of which is published under Mine No. 114 in the Table of Coal Analyses at the end of this Chapter, a fair quality of coal being revealed.

### Coal Prospect—No. 115 on Map II.

In New Interest District, Randolph County; on west slope of McGowan Mountain, 2 miles southeast of Pettit; Sewell (Sharon?) Coal; elevation, 3250' B.

| | Ft. | In. |
|---|---|---|
| Sandstone, pebbly | | |
| Concealed | 95 | 0 |
| Sandstone, massive, pebbly, makes cliff | 40 | 0 |
| Concealed | 65 | 0 |
| Coal, thickness concealed, reported | 4 | 0 |
| Concealed, shale, and sandstone, to red beds | 100 | 0 |

Mr. W. F. Lipscomb, of Parsons, is authority for the thickness of the coal, the prospect having fallen shut.

### *Sewell (Sharon?) Coal, Fairfax District.*

In Fairfax District the horizon of the Sewell (Sharon?) Coal outcrops only for about one mile in the gorges of Blackwater River and North Fork, as shown by Map II, there being no prospects. Farther north it is entirely under drainage, and, as no borings have pierced its horizon, little information is available from which to form a final opinion as to its thickness and character. From the evidence of Prospect No. 107, page 392, it would seem probable, however, that there is a limited amount of minable coal under Backbone Mountain, and from the evidence of Prospect No. 111, pages 393–4, it would seem likely that the coal is too thin for mining along the axis of the North Potomac Syncline.

### *Sewell (Sharon?) Coal, Davis District.*

In Davis District the Sewell (Sharon?) Coal horizon outcrops along the eastern plateau front of Canaan and Brown Mountains and on the western front of Cabin Mountain, being entirely eroded over the main area of the Blackwater Anticline except at the extreme north where the structure dips low enough to preserve it, the length of its exposed horizon being approximately 20 miles. So far as known no prospects have been made at any point. Since the entire region of its outcrop is cut-over land, it would seem probable that if coal of minable thickness existed it would have been found in some of the gullies and opened for inspection. In view of the above evidence and from the fact that the writer did not find coal at any of the several points where its horizon was examined, the conclusion is reached that little minable Sewell (Sharon?) Coal, if any, will be found in the district.

### *Sewell (Sharon?) Coal, Dry Fork District.*

In Dry Fork District the Sewell (Sharon?) Coal outcrops high up on the sides of Green, Canaan, Mozark, and Cabin Mountains, as shown by Map II, and also in the valley of Red Creek where it dips to a lower position along the axis of the

Stony River Syncline. It has been prospected at various points and in certain localities a considerable acreage of good coal is indicated. The following openings and exposures were noted:

### Otter Creek Boom & Lumber Company Exposure—No. 116 on Map II.

On Coal Run of Otter Creek, 1.1 miles southwest of Otter; Sewell (Sharon?) Coal; elevation, 2720' B.

| | Ft. | In. |
|---|---|---|
| Shale, dark, Hartridge | 9 | 6 |
| Coal | 0 | 6 |
| Sandstone, massive, Upper Raleigh (Sharon) | 30 | 0 |
| Concealed, with sandstone and shale, to red beds | 90 | 0 |

### Otter Creek Boom & Lumber Company Prospect—No. 117 on Map II.

On west side of Dry Fork, 1.2 miles south of Otter; Sewell (Sharon?) Coal; elevation, 2940' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Sandstone, massive, cliff, Guyandot | | | 30 | 0 |
| Concealed | | | 15 | 0 |
| Sandstone, massive, Lower Guyandot | | | 10 | 0 |
| Concealed | | | 15 | 0 |
| Coal, soft, reported | 1' | 6" | | |
| Slate, reported | 0 | 1 | | |
| Coal, soft, reported | 1 | 6 | 3 | 1 |

The above prospect had fallen shut, the section of the coal being reported by Adam Phillips, guide.

### Babcock Lumber & Boom Company Mine (Dobbin Manor Tract)— No. 118 on Map II.

On north side of Red Run, 4.6 miles northeastward from Otter; Sewell (Sharon?) Coal; elevation, 3275' B.

| | | | Ft. | In. |
|---|---|---|---|---|
| 1. Sandstone, massive, Lower Guyandot | | | 10 | 0 |
| 2. Coal, soft | 2' | 7" | | |
| 3. Coal, slaty | 1 | 0 | | |
| 4. Water, to bed of mine, about | 2 | 0 | 5 | 7 |

A sample (No. 433R) was collected from No. 2 of section, the composition of which is published under Mine No. 118 in the Table of Coal Analyses at the end of this Chapter. A considerable amount of coal was taken from this opening for use on the logging railroad when lumber operations were active in the region.

## Babcock Lumber & Boom Company Mine (Dobbin Manor Tract)—No. 119 on Map II.

Along old railroad grade, north side of Red Run, 4.7 miles northeastward from Otter; Sewell (Sharon?) Coal; elevation, 3255′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Sandstone, massive, Lower Guyandot | | | .. | .. |
| Slate, black | | | 0 | 4 |
| Coal, soft | 2′ | 7″ | | |
| Coal, slaty | 1 | 6 | 4 | 1 |
| Shale, dark | | | 1 | 6 |

Coal was mined on a considerable scale from this opening, also, when lumber operations were in progress, its location being less than one-fourth mile from Mine No. 118.

## Babcock Lumber & Boom Company (Dobbin Manor Tract) Exposure—No. 120 on Map II.

At old railroad summit on Mozark Mountain south of Red Run and 2.3 miles north of Elk; Sewell ((Sharon?) Coal; elevation, 3310′ B.

| | Ft. | In. |
|---|---|---|
| Coal, visible | 2 | 0 |

## Dobbin Manor Prospect—No. 121 on Map II.

On south slope of Mozark Mountain, 2.4 miles northeast of Elk; Sewell (Sharon?) Coal; elevation, 3320′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Sandstone, massive, great cliff rock, Nuttall, (estimated) | | | 60 | 0 |
| 2. | Concealed, (estimated) | | | 100 | 0 |
| 3. | Sandstone, massive | | | 5 | 0 |
| 4. | Coal, soft | 1′ | 2″ | | |
| 5. | Slate, bony | 0 | 1 | | |
| 6. | Coal | 0 | 6 | | |
| 7. | Coal, bony | 0 | 3 | 2 | 0 |
| 8. | Shale, pavement | | | | |

A sample (No. 434R) was collected from Nos. 4 and 6 of section, the composition of which is published under Mine No. 121 in the Table of Coal Analyses at the end of this Chapter. Although taken from soft, weathered coal, only 6 feet underground, the sample reveals good coal, low in ash and other impurities.

### R. D. Heironomus, Trustee, Prospect—No. 122 on Map II.

On east side of Canaan Mountain, 1.8 miles west of Cortland; Sewell (Sharon?) Coal; elevation, 3560′ B.

| | Ft. | In. |
|---|---|---|
| Fallen shut, coal, reported 1′ 6″ to | 3 | 0 |

Mr. Frank Cooper is authority for the thickness above named.

### Coal Exposure—No. 123 on Map II.

On east slope of Cooper Knob of Canaan Mountain, 1.9 miles southwest of Cortland; Sewell (Sharon?) Coal; elevation, 3690′ B.

Black slate, with coal horizon, reported as having been once prospected.

### Robert Bridges Heirs Prospect—No. 124 on Map II.

On Little Stonecoal Run of Red Creek, 0.9 mile above mouth and 2 miles northeast of Laneville; Sewell (Sharon?) Coal; elevation, 3260′ B.

| | | | | Ft. | In. |
|---|---|---|---|---|---|
| 1. | Shale, dark, sandy, with plant fossils, Hartridge | | | 20 | 0 |
| 2. | Coal, soft | 0′ | 4″ | | |
| 3. | Slate, dark | 0 | 4 | | |
| 4. | Coal | 0 | 2½ | | |
| 5. | Slate, dark, bony | 0 | 2½ | | |
| 6. | Coal, soft | 0 | 8 | 1 | 9 |
| 7, | Shale, dark, pavement | | | | |

A sample (No. 456R) was collected from Nos. 2, 4, and 6 of section (at outcrop), the composition of which is published under Mine No. 124 in the Table of Coal Analyses at the end of this Chapter.

### Robert Bridges Heirs Prospect—No. 125 on Map II.

On Stonecoal Run of Red Creek, 1 mile above mouth and 3 miles northeast of Laneville; Sewell (Sharon?) Coal; elevation, 3225′ B.

| | | Ft. | In. |
|---|---|---|---|
| 1. | Shale, dark, fissile, fossiliferous, Hartridge | 18 | 0 |
| 2. | Coal, soft | 1 | 8 |
| 3. | Shale, sandy | | |

A sample (No. 454R) was collected from No. 2 of section (at outcrop), the composition of which is published under **Mine No. 125** in the Table of Coal Analyses at the end of this Chapter.

### Robert Bridges Heirs Exposure—No. 126 on Map II.

On Red Creek, 4.1 miles northeast of Laneville; Sewell (Sharon?) Coal; elevation, 3175′ B.

| | | | Ft. | In. |
|---|---|---|---|---|
| Shale, sandy, with iron ore, Hartridge | | | 9 | 0 |
| Coal | 0′ | 8″ | | |
| Shale, sandy, dark | 9 | 0 | | |
| Coal, slaty, 2″ to | 1 | 3 | 10 | 11 |
| Shale, sandy | | | 2 | 6 |

### Robert Bridges Heirs Prospect—No. 127 on Map II.

In Randolph County, on a branch of Red Creek, 3.5 miles southeast of Laneville; Sewell (Sharon?) Coal; elevation, 3590′ B.

| | | Ft. | In. |
|---|---|---|---|
| 1. | Sandstone, massive, Lower Guyandot, visible | 5 | 0 |
| 2. | Shale, black, with shells and plant fossils, Hartridge | 15 | 0 |
| 3. | Coal, soft | 2 | 10 |
| 4. | Fire clay shale | 1 | 0 |
| 5. | Concealed, to creek | 10 | 0 |

A sample (No. 451R) was collected from No. 3 of section (at outcrop), the composition of which is published under **Mine No. 127** in the Table of Coal Analyses at the end of this Chapter.

### Coal Exposure—No. 128 on Map II.

In Randolph County, on west slope of Alleghany Front, 3 miles southeast of Laneville; Sewell (Sharon?) Coal; elevation, 3440′ B.
Coal blossom, thickness unknown.

### *Quantity of Sewell (Sharon?) Coal Available.*

The following table, compiled by Tucker from a planimetric measurement of the outcrop on Map II, as limited by Figure 11, show the probable amount of Sewell (Sharon?) Coal available in the county, an allowance in the thickness column having been made for the impurities and local absence of the seam:

PLATE XV.—Looking northwest up tributary of Horseshoe Run of Cheat River three-fourths mile above Maxwell Run, showing typical profile of Chemung Topography.

## Probable Amount of Sewell (Sharon?) Coal.

| Tucker County by Districts. | Thickness of Coal Assumed. Feet. | Square Miles. | Acres. | Cubic Feet of Coal. | Short Tons of Coal. (2000 Lbs.). |
|---|---|---|---|---|---|
| Licking | 0 | ..... | ...... | ............ | .......... |
| St. George | 2 | 1.35 | 864 | 75,271,680 | 3,010,867 |
| Black Fork | 2 | 16.00 | 10,240 | 892,108,800 | 35,684,352 |
| Fairfax | 2 | 10.85 | 6,944 | 604,961,280 | 24,198,451 |
| Davis | 0 | ..... | ...... | ............ | .......... |
| Dry Fork | 1½ | 49.10 | 31,424 | 2,053,244,160 | 82,129,766 |
| Totals | ...... | 77.30 | 49,472 | 3,625,585,920 | 145,023,436 |

## SUMMARY OF AVAILABLE COAL.

For convenience of reference, all the mines and prospects described in this Report have been given serial numbers which are printed in blue on Map II, along with the conventional mine or prospect symbols. Disregarding those that apply to coals having no commercial significance, the following table, compiled by Tucker, gives a list of the numbers that refer to the 5 commercial seams described in the present Chapter, as well as a summary of the total amount of coal that each seam is estimated to contain.

This table represents the amount of coal believed to have been available in Tucker County before mining began. Deducting one-third of the total Bakerstown (Thomas) Coal in Fairfax and Davis Districts as having already been mined, in accordance with the estimate on page 371, and one-fourth of the total Upper Freeport (Davis) for Fairfax District, only, according to the estimate on page 389, there remains a grand total of 428,512,497 tons of commercial coal in the county. Allowing for a recovery of 80 per cent., the total coal that may eventually be mined is, in round numbers, 342,810,000 short tons (2,000 pounds):

# Summary of Available Coal by Districts.

| Coal Bed. | Mine Nos. | Black Fork District. | Davis District. | Dry Fork District. | Fairfax District. | Licking District. | St. George District. | Totals. |
|---|---|---|---|---|---|---|---|---|
| Pittsburgh | 1–2 | .......... | .......... | .......... | .......... | .......... | .......... | .......... |
| Little Pittsburgh | 4 | .......... | .......... | .......... | 235,224 | .......... | .......... | 235,224 |
| Bakerstown (Thomas) | 11–25 | 55,757 | 30,248,064 | 13,939,200 | 66,908,160 | .......... | .......... | 111,151,181 |
| Upper Freeport (Davis) | 30–67 | 6,356,275 | 64,399,104 | 55,533,773 | 104,265,216 | .......... | .......... | 230,554,368 |
| Sewell (Sharon?) | 105–128 | 35,684,352 | .......... | 82,129,766 | 24,198,451 | .......... | 3,010,867 | 145,023,436 |
| Totals | .......... | 42,096,384 | 94,647,168 | 151,602,739 | 195,607,051 | .......... | 3,010,867 | 486,964,209 |

## MINABLE COALS BY MAGISTERIAL DISTRICTS.

The minable coals of Tucker County, described in this Report, have been described by Magisterial Districts on previous pages of this Chapter. In the Index, at the end of the Report, under the heading "Minable Coals by Magisterial Districts" will be found a list of page references making this information readily available without further discussion.

## TABLE OF COAL ANALYSES.

The following table, compiled by Tucker, containing the proximate analyses of 42 mines and prospects, together with the ultimate analyses, calorific determinations, and fuel ratios of many of these, is the exclusive work of members of the Survey Staff. All the samples were taken by the writer in the field, those from commercial mines being cut on a large cloth, mixed, pulverized, and quartered until the coal remaining filled a small tin can, in which it was hermetically sealed. Samples from prospects or remote openings where standard equipment could not be taken were collected in small bags with as much care as was possible.

The chemical work was done by J. B. Krak, Assistant Chemist, working under the direction and with the assistance of B. H. Hite, Chief Chemist, in the Laboratory of the Survey at Morgantown.

In addition to the analyses given in the table, several others are published on the preceding pages, along with the descriptions of the mines from which they were taken, the same being furnished the Survey by mine owners or other interested parties, having been made in private laboratories. Many of these are doubtless quite as accurate as those to be found in the Survey Table, but it is thought best to present them separately.

In the Survey Table below, the numbers on the left-hand margin correspond to the numbers given with the descriptions of the mines and with the symbols on Map II. All the samples were cut from the mining sections of the seams, unless otherwise described, the usual method being to discard from the samples such slates or other impurities as would be rejected in ordinary commercial shipment:

# Table of Coal Analyses

(Under the heading "Condition of Sample" "A. D."=Air Dried and "A. R."=As Received).

| No. on Map II | Mine. | Coal Bed. | Condition of Sample. | Proximate. Moisture. | Volatile Matter. | Fixed Carbon. | Phosphorus. |
|---|---|---|---|---|---|---|---|
| 4 | Davis Coal & Coke Co. No. 61.. | Little Pittsburgh....... | A. D. | 0.86 | 25.94 | 67.85 | 0.099 |
| 4 | Davis Coal & Coke Co. No. 61.. | Little Pittsburgh....... | A. R. | 0.86 | 25.94 | 67.85 | 0.099 |
| 11 | Davis Coal & Coke Co. No. 24... | Bakerstown (Thomas)... | A. D. | 0.66 | 26.09 | 63.82 | 0.033 |
| 11 | Davis Coal & Coke Co. No. 24... | Bakerstown (Thomas)... | A. R. | 2.70 | 25.56 | 62.50 | 0.033 |
| 16 | Davis Coal & Coke Co. No. 25... | Bakerstown (Thomas)... | A. D. | 0.49 | 25.03 | 64.81 | 0.033 |
| 16 | Davis Coal & Coke Co. No. 25... | Bakerstown (Thomas)... | A. R. | 0.49 | 25.03 | 64.81 | 0.033 |
| 17 | Davis Coal & Coke Co. No. 23... | Bakerstown (Thomas)... | A. D. | 0.63 | 23.01 | 68.51 | 0.015 |
| 17 | Davis Coal & Coke Co. No. 23... | Bakerstown (Thomas)... | A. R. | 2.04 | 22 68 | 67.54 | 0.015 |
| 20 | Davis Coal & Coke Co. No. 23.. New (Pendleton Run)...... | Bakerstown (Thomas)... | A. D. | 0.72 | 24.14 | 68.26 | 0.072 |
| 20 | Davis Coal & Coke Co. No. 23.. New (Pendleton Run)...... | Bakerstown (Thomas)... | A. R. | 4.32 | 23.27 | 65.78 | 0.072 |
| 22 | Davis Coal & Coke Co. No. 29... | Bakerstown (Thomas)... | A. D. | 0.74 | 23.25 | 68.44 | 0.006 |
| 22 | Davis Coal & Coke Co. No. 29... | Bakerstown (Thomas)... | A. R. | 5.33 | 22.18 | 65.27 | 0.006 |
| 23 | Davis Coal & Coke Co. No. 29½. | Bakerstown (Thomas)... | A. D. | 1.10 | 26.72 | 64.10 | 0.014 |
| 23 | Davis Coal & Coke Co. No. 29½. | Bakerstown (Thomas)... | A. R. | 4.26 | 25.87 | 62.05 | 0.014 |
| | Average ................. | Bakerstown (Thomas)... | A. D. | 0.72 | 24.71 | 66.32 | 0.029 |
| | Average ................. | Bakerstown (Thomas)... | A. R. | 3.19 | 24.10 | 64.66 | 0.029 |
| 38 | Cumberland Coal Co. No. 1..... | Upper Freeport (Davis).. | A. D. | 0.83 | 26.27 | 65.30 | 0.009 |
| 38 | Cumberland Coal Co. No. 1..... | Upper Freeport (Davis).. | A. R. | 6.31 | 24.82 | 61.69 | 0.009 |
| 44 | Cumberland Coal Co. No. 2..... | Upper Freeport (Davis).. | A. D. | 0.42 | 19.27 | 71.83 | 0.010 |
| 44 | Cumberland Coal Co. No. 2..... | Upper Freeport( Davis).. | A. R. | 3.98 | 18.57 | 69.27 | 0.010 |
| 47 | Davis Coal & Coke Co. No. 36... | Upper Freeport (Davis).. | A. D. | 0.47 | 24.07 | 68.55 | 0.058 |
| 47 | Davis Coal & Coke Co. No. 36... | Upper Freeport (Davis).. | A. R. | 4.09 | 23.19 | 66.06 | 0.058 |
| 48 | Davis Coal & Coke Co. No. 37.. | Upper Freeport (Davis).. | A. D. | 0.77 | 24.68 | 67.93 | 0.017 |
| 48 | Davis Coal & Coke Co. No. 37.. | Upper Freeport (Davis).. | A. R. | 4.88 | 23.66 | 65.11 | 0.017 |
| 51 | Davis Coal & Coke Co. No. 38... | Upper Freeport (Davis).. | A. D. | 0.98 | 24.82 | 67.57 | 0.008 |
| 51 | Davis Coal & Coke Co. No. 38... | Upper Freeport (Davis).. | A. R. | 2.73 | 24.38 | 66.38 | 0.009 |
| 52 | Davis Coal & Coke Co. No. 34... | Upper Freeport (Davis).. | A. D. | 0.58 | 24.59 | 64.94 | 0.011 |
| 52 | Davis Coal & Coke Co. No. 34... | Upper Freeport (Davis).. | A. R. | 2.88 | 24.01 | 63.45 | 0.011 |
| 53 | Davis Coal & Coke Co. No.39... | Upper Freeport (Davis).. | A. D | 0.87 | 22.89 | 69.63 | 0.027 |
| 53 | Davis Coal & Coke Co. No.39... | Upper Freeport (Davis).. | A. R. | 2.87 | 22.43 | 68.22 | 0.027 |
| 54 | Davis Coal & Coke Co. No. 40... | Upper Freeport (Davis).. | A. D. | 0.70 | 24.37 | 68.89 | 0.026 |
| 54 | Davis Coal & Coke Co. No. 40.. | Upper Freeport (Davis).. | A. R. | 3.28 | 23.74 | 67.10 | 0.026 |
| 55 | Davis Coal & Coke Co. No 43... | Upper Freeport (Davis).. | A. D. | 0.70 | 23.56 | 70.09 | 0.071 |
| 55 | Davis Coal & Coke Co. No 43... | Upper Freeport (Davis).. | A. R. | 4.06 | 22.76 | 67.72 | 0.071 |
| 57 | Davis Coal & Coke Co. No. 42.. | Upper Freeport (Davis).. | A. D. | 0.71 | 22.92 | 70.08 | 0.066 |
| 57 | Davis Coal & Coke Co. No. 42.. | Upper Freeport (Davis).. | A. R. | 4.15 | 22.13 | 67.65 | 0.065 |
| 60 | Blackwater Coal Co. (U.B.).... | Upper Freeport (Davis).. | A. D. | 0.76 | 22.50 | 65.77 | 0.008 |
| 60 | Blackwater Coal Co. (U.B.).... | Upper Freeport (Davis).. | A. R. | 2.78 | 22.04 | 64.43 | 0.008 |
| 60 | Blackwater Coal Co. (L.B.).... | Upper Freeport (Davis).. | A. D. | 0.77 | 23.80 | 64.85 | 0.004 |
| 60 | Blackwater Coal Co. (L.B.).... | Upper Freeport (Davis).. | A. R. | 3.06 | 23.25 | 63.35 | 0.004 |
| 64 | Beacon Coal & Coke Co........ | Upper Freeport (Davis).. | A. R. | 1.03 | 19.87 | 67.68 | 0.058 |
| 65 | Gatzmer Coal & Coke Co....... | Upper Freeport (Davis).. | A. R. | 1.09 | 20.44 | 67.36 | 0.053 |
| 67 | *Robert Bridges Heirs......... | Upper Freeport (Davis).. | A. R. | 1.78 | 21.31 | 56.93 | 0.050 |
| | Average ................. | Upper Freeport (Davis).. | A. D. | 0.71 | 23.65 | 67.95 | 0.026 |
| | Average ................. | Upper Freeport (Davis).. | A. R. | 3.37 | 22.52 | 66.11 | 0.030 |
| 73 | W. Va. Central & Pittsburgh Ry. | Upper Kittanning....... | A. R. | 0.79 | 24.02 | 60.13 | 0.018 |
| 76 | Dobbin Manor............... | Lower Kittanning....... | A. R. | 5.36 | 22.24 | 53.95 | 0.081 |
| 77 | Dobbin Manor............... | Lower Kittanning....... | A. R. | 0.85 | 30.51 | 57.24 | 0.042 |
| | Average ................. | Lower Kittanning....... | A. R. | 3.10 | 26.38 | 55.60 | 0.061 |
| 85 | Babcock Lumber & Boom Co.... | Upper Mercer......... | A. R. | 0.81 | 23.23 | 52.81 | 0.073 |
| 86 | Granville Schoonover.......... | Quakertown "Rider"..... | A. R. | 2.60 | 29.60 | 64.29 | 0.005 |
| 87 | Granville Schoonover.......... | Quakertown (Winifrede?). | A. R. | 6.64 | 28.65 | 45.10 | 0.006 |
| 89 | W. Va. Central & Pittsburgh Ry. | Quakertown (Winifrede?). | A. R. | 0.83 | 27.22 | 69.47 | 0.003 |
| | Average ................. | Quakertown (Winifrede?). | A. R. | 3.73 | 27.94 | 57.29 | 0.0045 |
| 99 | Otter Creek Boom & Lumber Co. | Hughes Ferry.......... | A. R. | 0.90 | 25.11 | 71.19 | 0.002 |
| 100 | Otter Creek Boom & Lumber Co.. | Hughes Ferry.......... | A. R. | 1.00 | 24.25 | 47.26 | 0.009 |
| | Average ................. | Hughes Ferry.......... | A. R. | 0.95 | 24.68 | 59.23 | 0.005 |
| 107 | Davis Coal & Coke Co......... | Sewell .............. | A. R. | 1.93 | 25.89 | 62.51 | 0.023 |
| 110 | Babcock Lumber & Boom Co.... | Sewell .............. | A. R. | 1.85 | 24.93 | 66.97 | 0.015 |
| 111 | Western Maryland Ry.......... | Sewell .............. | A. R. | 2.48 | 24.14 | 59.43 | 6.008 |
| 112 | J. P. Scott et al............. | Sewell .............. | A. R. | 0.90 | 23.85 | 53.30 | 0.012 |
| 114 | Adam Phillips................ | Sewell .............. | A. R. | 0.91 | 24.20 | 63.86 | 0.038 |
| 118 | Babcock Lumber & Boom Co... | Sewell .............. | A. R. | 0.80 | 26.85 | 65.94 | 0.003 |
| 121 | Dobbin Manor............... | Sewell .............. | A. R. | 10.22 | 31.14 | 54.09 | 0.002 |
| 124 | Robert Bridges Heirs.......... | Sewell .............. | A. R. | 1.05 | 19.07 | 73.09 | 0.022 |
| 125 | Robert Bridges Heirs.......... | Sewell .............. | A. R. | 0.82 | 18.20 | 66.83 | 0.012 |
| 127 | Robert Bridges Heirs.......... | Sewell .............. | A. R. | 0.82 | 18.99 | 60.93 | 0.007 |
| | Average ................. | Sewell .............. | A. R. | 2.18 | 23.73 | 62.69 | 0.014 |
| 135 | Robert Bridges Heirs.......... | Fire Creek............ | A. R. | 0.90 | 18.08 | 39.97 | 0.029 |

*Not included in average.

| Common to Both. | | Ultimate. | | | | Calorimeter B. T. U. for 1 Lb. of Coal. | Calculated B. T. U. for 1 Lb. of Coal. | Carbon Ratio. | Carbon Divided by Oxygen + Ash. |
|---|---|---|---|---|---|---|---|---|---|
| Ash. | Sulphur. | Carbon. | Hydrogen. | Oxygen. | Nitrogen. | | | | |
| 5.35 | 0.95 | 82.82 | 5.08 | 4.48 | 1.32 | 14.890 | 14,790 | ......... | 8.43 |
| 5.35 | 0.95 | 82.82 | 5.08 | 4.48 | 1.32 | 14,890 | 14,790 | 0.723 | 8.43 |
| 9.43 | 0.69 | 80.08 | 4.74 | 3.83 | 1.23 | 14,330 | 14,500 | ......... | 6.04 |
| 9.24 | 0.68 | 78.44 | 4.86 | 5.57 | 1.21 | 14,040 | 14,210 | 0.709 | 5.29 |
| 9.67 | 0.93 | 79.58 | 5.03 | 3.30 | 1.49 | 14,250 | 14,480 | ......... | 6.13 |
| 9.67 | 0.93 | 79.58 | 5.03 | 3.30 | 1.49 | 14,250 | 14,480 | 0.721 | 6.13 |
| 7.85 | 0.89 | 81.30 | 5.22 | 3.20 | 1.54 | 14,600 | 14,850 | ......... | 7.36 |
| 7.74 | 0.87 | 80.15 | 5.31 | 4.45 | 1.48 | 14,390 | 14,640 | 0.748 | 6.57 |
| 6.38 | 0.55 | 82.37 | 4.82 | 4.10 | 1.28 | 14,760 | 14,680 | ......... | 7.50 |
| 6.63 | 0.53 | 79.38 | 5.05 | 7.18 | 1.23 | 14,230 | 14,150 | 0.738 | 5.75 |
| 7.57 | 0.37 | 81.83 | 4.90 | 4.02 | 1.31 | 14,550 | 14,780 | ......... | 7.06 |
| 7.22 | 0.35 | 78.04 | 5.18 | 7.96 | 1.25 | 13,880 | 14,100 | 0.746 | 5.14 |
| 8.08 | 2.25 | 78.85 | 5.06 | 4.55 | 1.21 | 14,380 | 14,340 | ......... | 6.24 |
| 7.82 | 2.18 | 76.33 | 5.15 | 7.35 | 1.17 | 13,920 | 13,890 | 0.705 | 5.03 |
| 8.25 | 0.95 | 80.67 | 4.96 | 3.83 | 1.34 | 14,478 | 14,605 | ......... | 6.72 |
| 8.05 | 0.92 | 78.65 | 5.10 | 5.97 | 1.31 | 14,118 | 14,245 | 0.728 | 5.65 |
| 7.60 | 1.09 | 80.95 | 5.23 | 4.03 | 1.07 | 14,500 | 14,750 | ......... | 6.94 |
| 7.18 | 1.03 | 76.48 | 5.55 | 8.75 | 1.01 | 13,700 | 13,940 | 0.718 | 4.80 |
| 8.48 | 1.63 | 81.17 | 4.61 | 2.67 | 1.44 | 14,370 | 14,530 | ......... | 7.28 |
| 8.18 | 1.57 | 78.27 | 4.85 | 5.75 | 1.38 | 13,860 | 14,010 | 0.788 | 5.62 |
| 6.91 | 0.62 | 82.35 | 4.94 | 3.98 | 1.20 | 14,820 | 14,760 | ......... | 7.56 |
| 6.66 | 0.60 | 79.35 | 5.16 | 7.10 | 1.13 | 14,280 | 14,220 | 0.740 | 5.77 |
| 6.62 | 0.38 | 82.43 | 5.14 | 4.14 | 1.29 | 14,740 | 14,880 | ......... | 7.66 |
| 6.35 | 0.36 | 79.02 | 5.38 | 7.65 | 1.24 | 14.130 | 14.270 | 0.753 | 5.64 |
| 6.63 | 0.60 | 82.47 | 4.82 | 4.02 | 1.46 | 14,580 | 14,680 | ......... | 7.74 |
| 6.51 | 0.59 | 81.01 | 4.92 | 5.54 | 1.43 | 14,330 | 14,420 | 0.731 | 6.72 |
| 9.89 | 1.18 | 78.04 | 4.83 | 4.64 | 1.42 | 14,120 | 14,180 | ......... | 5.44 |
| 9.66 | 1.15 | 76.84 | 4.96 | 6.00 | 1.39 | 13,790 | 13,850 | 0.725 | 4.91 |
| 6.61 | 0.55 | 82.68 | 4.88 | 3.89 | 1.39 | 14,710 | 14,770 | ......... | 7.87 |
| 6.48 | 0.54 | 81.01 | 5.00 | 5.61 | 1.36 | 14,410 | 14,480 | 0.752 | 6.70 |
| 6.04 | 0.58 | 82.87 | 4.94 | 4.14 | 1.43 | 14,740 | 14,820 | ......... | 8.14 |
| 5.88 | 0.56 | 80.72 | 5.10 | 6.35 | 1.39 | 14,360 | 14,440 | 0.738 | 6.60 |
| 5.65 | 0.63 | 81.74 | 4.94 | 5.50 | 1.54 | 14,890 | 14,550 | ......... | 7.33 |
| 5.46 | 0.61 | 78.96 | 5.19 | 8.29 | 1.49 | 14,380 | 14,060 | 0.748 | 5.74 |
| 6.29 | 0.36 | 82.75 | 4.85 | 4.70 | 1.05 | 14,850 | 14,690 | ......... | 7.53 |
| 6.07 | 0.35 | 79.89 | 5.06 | 7.62 | 1.01 | 14,340 | 14,190 | 0.753 | 5.84 |
| 10.97 | 2.03 | 76.74 | 4.90 | 4.17 | 1.19 | 13,910 | 13,960 | ......... | 5.07 |
| 10.75 | 1.99 | 75.17 | 5.02 | 5.90 | 1.17 | 13,630 | 13,680 | 0.745 | 4.51 |
| 10.58 | 2.82 | 77.34 | 4.95 | 2.96 | 1.35 | 14,000 | 14,200 | ......... | 5.71 |
| 10.34 | 2.76 | 75.55 | 5.10 | 4.93 | 1.32 | 13,680 | 13,880 | 0.731 | 4.95 |
| 11.42 | 0.99 | 77.47 | 4.29 | 4.40 | 1.43 | 13,970 | 13,630 | 0.773 | 4.90 |
| 11.11 | 1.48 | 77.54 | 4.89 | 3.60 | 1.38 | 14,080 | 14,090 | 0.767 | 5.27 |
| 19.98 | 1.48 | 67.76 | 3.85 | 5.70 | 1.23 | 12,100 | 11,940 | 0.727 | 2.64 |
| 7.69 | 1.04 | 80.96 | 4.92 | 4.07 | 1.32 | 14,519 | 14,564 | ......... | 7.02 |
| 8.00 | 1.04 | 78.38 | 5.03 | 6.25 | 1.30 | 14,067 | 14,084 | 0.745 | 5.57 |
| 15.06 | 5.22 | 71.42 | 4.15 | 3.10 | 1.05 | 13,140 | 12,930 | 0.714 | 3.93 |
| 18.45 | 0.46 | ...... | ...... | ...... | ...... | ......... | ......... | 0.708 | ......... |
| 11.40 | 1.32 | 76.27 | 4.55 | 5.05 | 1.41 | 13,760 | 13,580 | 0.652 | 4.64 |
| 14.92 | 0.89 | ...... | ...... | ...... | ...... | ......... | ......... | 0.680 | ......... |
| 23.15 | 3.13 | 65.00 | 3.87 | 3.74 | 1.11 | 11,660 | 11,690 | 0.694 | 2.42 |
| 3.51 | 0.55 | ...... | ...... | ...... | ...... | ......... | ......... | 0.661 | ......... |
| 19.61 | 0.60 | ...... | ...... | ...... | ...... | ......... | ......... | 0.611 | ......... |
| 2.48 | 0.46 | ...... | ...... | ...... | ...... | ......... | ......... | 0.718 | ......... |
| 11.04 | 0.53 | ...... | ...... | ...... | ...... | ......... | ......... | 0.665 | ......... |
| 2.80 | 0.66 | 86.52 | 5.07 | 3.62 | 1.33 | 15,330 | 15,480 | 0.739 | 13.48 |
| 27.49 | 1.00 | ...... | ...... | ...... | ...... | ......... | ......... | 0.661 | ......... |
| 15.14 | 0.83 | ...... | ...... | ...... | ...... | ......... | ......... | 0.700 | ......... |
| 9.67 | 0.58 | ...... | ...... | ...... | ...... | ......... | ......... | 0.707 | ......... |
| | | | | | | | | 0.728 | 6.38 |
| 13.95 | 0.41 | ...... | ...... | ...... | ...... | ......... | ......... | 0.711 | ......... |
| 21.95 | 0.63 | 67.19 | 4.41 | 4.57 | 1.25 | 11,740 | 12,180 | 0.691 | 2.61 |
| 11.03 | 0.33 | ...... | ...... | ...... | ...... | ......... | ......... | 0.725 | ......... |
| 6.41 | 0.44 | 82.08 | 4.72 | 5.13 | 1.22 | 14,820 | 14,490 | 0.711 | 7.11 |
| 4.55 | 0.44 | ...... | ...... | ...... | ...... | ......... | ......... | 0.634 | ......... |
| 6.79 | 0.60 | ...... | ...... | ...... | ...... | ......... | ......... | 0.793 | ......... |
| 14.15 | 2.79 | ...... | ...... | ...... | ...... | ......... | ......... | 0.785 | ......... |
| 19.26 | 2.71 | 69.94 | 3.86 | 3.25 | 0.98 | 12,680 | 12,430 | 0.762 | 3.11 |
| 11.40 | 0.93 | 75.16 | 4.33 | 4.87 | 1.12 | 13,427 | 13,285 | 0.725 | 4.80 |
| 41.05 | 0.37 | ...... | ...... | ...... | ...... | ......... | ......... | 0.688 | ......... |

## Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table.

| No. on Map II. | Sample No. | Coal Bed and Name of Owner. | Location. | Page |
|---|---|---|---|---|
| | | Little Pittsburgh. | | |
| 4 | 383–R | Davis Coal & Coke Co. No. 61 | 0.2 mi. N. of Fairfax Summit | 362 |
| | | Bakerstown (Thomas). | | |
| 11 | 394–R | Davis Coal & Coke Co. No. 24 | 0.4 mi. S. of Coketon | 365 |
| 16 | 390–R | Davis Coal & Coke Co. No. 25 | At Thomas | 366–7 |
| 17 | 391–R | Davis Coal & Coke Co. No. 23 | At Thomas | 367 |
| 20 | 397–R | Davis Coal & Coke Co. No. 23 (New) (Pendleton Run) | 1.9 mi. N.E. of Thomas | 368–9 |
| 22 | 393–R | Davis Coal & Coke Co. No. 29 | 2.0 mi. N.E. of Davis | 369 |
| 23 | 392–R | Davis Coal & Coke Co. No. 29½ | 2.0 mi. N.E. of Davis | 370 |
| | | Upper Freeport (Davis). | | |
| 38 | 401–R | Cumberland Coal Co. No. 1 | 0.3 mi. S.W. of Douglas | 375–6 |
| 44 | 400–R | Cumberland Coal Co. No. 2 | 0.6 mi. S.E. of Douglas | 377–8 |
| 47 | 395–R | Davis Coal & Coke Co. No. 36 | 0.3 mi. S. of Coketon | 379 |
| 48 | 396–R | Davis Coal & Coke Co. No. 37 | 0.2 mi. S.W. of Coketon | 379 |
| 51 | 388–R | Davis Coal & Coke Co. No. 38 | At Benbush | 380 |
| 52 | 389–R | Davis Coal & Coke Co. No. 34 | At Thomas | 381 |
| 53 | 385–R | Davis Coal & Coke Co. No. 39 | Just S. E. of Pierce | 381–2 |
| 54 | 384–R | Davis Coal & Coke Co. No. 40 | Just N.W. of Pierce | 382 |
| 55 | 386–R | Davis Coal & Coke Co. No. 43 | 1.1 mi. N.W. of Pierce | 382–3 |
| 57 | 387–R | Davis Coal & Coke Co. No. 42 | At Kempton | 383 |
| 60 | 398–R | Blackwater Coal Co. (Upper Bench) | Just west of Davis | 385 |
| 60 | 399–R | Blackwater Coal Co. (Lower Bench) | Just west of Davis | 385 |
| 64 | 404–R | Beacon Coal & Coke Co. | 1.5 mi. S.W. of Gatzmer | 386 |
| 65 | 405–R | Gatzmer Coal & Coke Co. | 0.6 mi. S.W. of Gatzmer | 386–7 |
| 67 | 455–R | Robert Bridges Heirs | 3.2 mi. N.E. of Laneville | 388 |
| | | Upper Kittanning. | | |
| 73 | 459–R | W. Va. Central & Pittsburgh Ry. | 0.5 mi. N.E. of Douglas | 187 |
| | | Lower Kittanning. | | |
| 76 | 429–R | Dobbin Manor | 1.7 mi. N.E. of Otter | 189–90 |
| 77 | 430–R | Dobbin Manor | 3.3 mi. eastward from Hendricks | 190 |
| | | Upper Mercer. | | |
| 85 | 449–R | Babcock Lumber & Boom Co. | At Davis | 203 |
| | | Quakertown "Rider." | | |
| 86 | 406–R | Granville Schoonover | 3.4 mi. N.E. of Hendricks | 205 |
| | | Quakertown (Winifrede?). | | |
| 87 | 407–R | Granville Schoonover | 3.4 mi. N.E. of Hendricks | 206–7 |
| 89 | 412–R | W. Va. Central & Pittsburgh Ry. | E. slope Backbone Mountain at head of Long Run of North Fork | 207 |
| | | Hughes Ferry. | | |
| 99 | 428–R | Otter Creek Boom & Lumber Co. | On Possession Camp Run, ½ mi. S. of County Line | 215–16 |
| 100 | 426–R | Otter Creek Boom & Lumber Co. | On W. side Otter Creek, 1.5 mi. above County Line | 216 |
| | | Sewell. | | |
| 107 | 424–R | Davis Coal & Coke Co. | 1.8 mi. N.W. of Pierce | 392 |
| 110 | 432–R | Babcock Lumber & Boom Co. | 3.4 mi. eastward from Hendricks | 393 |
| 111 | 410–R | Western Maryland Ry. | 1.5 mi. S.W. of Douglas | 393–4 |
| 112 | 414–R | J. P. Scott et al. | 1.4 mi. E. of Hendricks | 394 |
| 114 | 427–R | Adam Phillips | 1.0 mi. N.W. of Otter | 395 |
| 118 | 433–R | Babcock Lumber & Boom Co. | 4.6 mi. northeastward from Otter | 397 |
| 121 | 434–R | Dobbin Manor | 2.4 mi. N.E. of Elk | 398 |
| 124 | 456–R | Robert Bridges Heirs | 2.0 mi. N.E. of Laneville | 399 |
| 125 | 454–R | Robert Bridges Heirs | 3.0 mi. N.E. of Laneville | 399 |
| 127 | 451–R | Robert Bridges Heirs | 3.5 mi. S.E. of Laneville | 400 |
| | | Fire Creek. | | |
| 135 | 453–R | Robert Bridges Heirs | Stonecoal Run of Red Creek | 223–4 |

# CHAPTER XIV.

## LIMESTONE.

### GENERAL STATEMENT.

The limestone resources of Tucker County are so large and so important from an economic viewpoint that it seems advisable to assemble the essential data in one Chapter where it may be available in concise form, either by reference or direct description. Next to its coal, limestone is the most valuable commodity that Tucker County can now offer to the markets of the country. It originally contained five principal items of natural wealth, the same being its timber, coal, limestone, water-power resources, and agricultural soils. Of these the timber has been almost entirely removed, leaving many great, barren wastes, some of which may never produce timber again. The coals are being exploited on a large scale and the agricultural soils, in many localities, have been impoverished by over-cultivation and by the washing effect of heavy rains since the removal of the vegetation. The original wealth of limestone, however, remains practically untouched, only a few thousand tons having been quarried, and the water-power resources are still available, only a small fraction having been developed. It is believed that the latter two items, if developed in conjunction, offer the possibility of establishing a vast industrial activity that may continue for an indefinite period of time.

### LIMESTONES OF THE PENNSYLVANIAN PERIOD.

In the Pennsylvanian Period there are only a few thin and siliceous beds of limestone in the county, offering no prospect of commercial exploitation. All of them have been fully described in Chapters V to VII, inclusive, references to their detailed discussion being listed in the following table:

### Page References to Detailed Descriptions of Pennsylvanian Limestones.



## LIMESTONES OF THE MISSISSIPPIAN PERIOD.

The Mississippian Period contains the principal outcropping limestones of the county, there being large deposits in a portion of it.

### LIMESTONES OF THE MAUCH CHUNK SERIES.

In the Mauch Chunk Series, or Red Beds, of the Mississippian Period, no calcareous horizons were observed except the **Hinton Limestone**, which occurs in Dry Fork District. As described in Chapter VIII, page 229, it belongs near the base of the series, being 5 to 25 feet in thickness. As sampled near Flanagan Hill it contains 88.50 per cent. of calcium carbonate. On account of its usually thin bed section it offers no opportunity for commercial exploitation but in a few localities would afford a fair grade of local, agricultural lime. It possibly correlates with the "Little Lime" of the oil and gas well drillers.

## LIMESTONES OF THE GREENBRIER SERIES.

In the Greenbrier Series of the Mississippian Period, the principal outcropping limestone of the county occurs, the series being composed almost entirely of calcareous sediments, with occasional sandy or shaly beds. No attempt has been made in the State to subdivide this series into smaller members, as it has generally been considered a lithologic unit. It is of wide extent, being found all over that portion of the State lying west of the main ridges of the Alleghany Mountains, and being known to occur in many other States where the rocks of the Mississippian Period are present, various titles having been applied to it in different localities. As described in Chapter IX, it varies in thickness in the county, being 165 feet in the northwestern portion and increasing to 430 feet in the southeastern corner. In Chapter IV it is noted in the sections for Buena, Elklick, Flanagan Hill, Hendricks, Laneville, Laurel Run of Dry Fork, Limestone Mountain, Otter Creek, and Parsons. Detailed descriptions of quarries and exposures, arranged by districts, follow:

### *Limestone Quarries and Exposures, Licking District.*

In Licking District the Greenbrier Limestone outcrops for about one-half mile along the eastern side of the Laurel Ridge at the extreme western end of the district, near the corner of Tucker, Preston, and Barbour Counties. Farther east, along the axis of the Hannahsville Syncline, it entirely encircles Limestone Mountain, being 800 to 900 feet above Cheat River. The following quarries were noted:

#### William Cupp Limestone Quarry.

On Limestone Mountain, 0.3 mile west of Limestone Church.

| | Ft. | In. |
|---|---|---|
| 1. Shale, red.................................... | | |
| 2. Limestone, hard, gray, quarry rock (2425' B.) | 10 | 0 |
| 3. Limy soil and concealed.................... | 25 | 0 |
| 4. Sandstone, gray, Pocono.................... | | |

A sample (No. 408R) was collected from No. 2 of section, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. The quarry is 100 feet long and extends 50 feet into the hill, its product having been used for local agricultural lime. It it known as the "Black Marble Quarry", on account of the black and somewhat crystalline character of the limestone that is reported to be present in the concealed interval (No. 3).

### Ernest Adams Limestone Quarry.

On Limestone Mountain, 1 mile southwest of Limestone Church.

| | Ft. | In. |
|---|---|---|
| 1. Soil ........................................ | | |
| 2. Limestone, gray, hard...................... | 15 | 0 |
| 3. Limestone, black, very hard, so-called "Black Marble", (2460′ B.), visible................ | 1 | 3 |

A sample (No. 409R) was collected from No. 2 of section, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. The quarry (Nos. 2 and 3) is 100 feet long and extends 25 feet into the hill, the product being used for local agricultural lime.

## *Limestone Quarries and Exposures, Clover District.*

In Clover District the Greenbrier Limestone outcrops for about 7 miles along the eastern base of Laurel Ridge, next to Barbour County, the following quarries and exposures having been noted:

### Albert Loughridge Limestone Quarry.

On the head of Licking Creek, 1.1 miles south of the corner of Tucker, Barbour, and Preston Counties.

| | Ft. | In. |
|---|---|---|
| Limestone, hard, gray, sandy at base (2445′ B.).. | 40 | 0 |

It is reported by Mr. Loughridge that a sandstone comes above this bench of lime, following by another stratum of lime, after which the red shales of the Mauch Chunk appear. A sample (No. 425R) was collected from the face of the quarry, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. The quarry is 200 feet long and extends 30 feet into the hill, the product having been used for agricultural lime, quite a large amount annually being hauled across Laurel Ridge to Barbour County.

On Brushy Fork of Teter Creek, which has cut a deep channel through the Laurel Ridge, there is a good exposure of the limestone, about 2½ miles northwest of Texas, and 3 miles east of Valley Furnace, its outcrop dipping westward under drainage a short distance from the Barbour County Line.

### *Limestone Quarries and Exposures, St. George District.*

In St. George District the Greenbrier Limestone outcrops along the western side of Backbone Mountain from the Preston County Line southwestward to the St. George—Black Fork District Line, a distance of 8 miles, being more than half way up the slope of the mountain. Along most of this outcrop, however, it is poorly exposed, being covered with soil. Along the road east of Lead Mine it is totally obscured but on the Sugarland road, farther south, a ledge, 10 feet in thickness, is visible at an elevation of 2985′ B., belonging not far from the middle of the deposit. No quarries were observed in the district.

### *Limestone Quarries and Exposures, Black Fork District.*

In Black Fork District the Greenbrier Limestone outcrops along the western and southern sides of Backbone Mountain, going under drainage on Blackwater River 3 miles east of Hendricks; also along the northern and western bases of Canaan Mountain on Blackwater and Dry Fork Rivers; also on the western, northern, and eastern sides of McGowan Mountain, its outcrop at the latter locality extending up Dry Fork River and thence up Otter Creek for four miles. The following quarries and exposures were examined and sampled:

## N. J. Pennington Limestone Exposure.

On a branch of Roaring Run of Dry Fork, 2 miles northeastward from Hendricks.

| | | Ft. | In. |
|---|---|---|---|
| 1. | Red soil, Mauch Chunk | | |
| 2. | Limestone, gray, with brachiopods, bryozoa, and corals | 10 | 0 |
| 3. | Concealed and red soil | 30 | 0 |
| 4. | Limestone, gray, with numerous small crinoids and blastoids (pentremites) | 15 | 0 |
| 5. | Soil, limy, red | 25 | 0 |
| 6. | Limestone, gray, brecciated | 15 | 0 |
| 7. | Soil, red, with red sandstone and shale | 25 | 0 |
| 8. | Limestone, gray, with small crinoids and brachiopods | 10 | 0 |
| 9. | Shale, red, and red, shaly sandstone | 20 | 0 |
| 10. | Limestone, hard, gray, massive, to Greenbrier-Pocono contact (2470′ B.) | 60 | 0 |
| | Total | 210 | 0 |

A sample (No. 446R) was collected from No. 10 of section, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. The fossiliferous identifications were made by Dr. Price in the field, subject to revision and amplification.

## George Davis Limestone Exposure.

Along Western Maryland Railway, on north side of Blackwater River, 2 miles northeast of Hendricks.

| | | Ft. | In. |
|---|---|---|---|
| 1. | Concealed (Mauch Chunk Reds) | | |
| 2. | Limestone | 5 | 0 |
| 3. | Concealed | 15 | 0 |
| 4. | Limestone, shaly, partly concealed | 115 | 0 |
| 5. | Limestone, hard, gray (1925′ B.) | 100 | 0 |
| 6. | Sandstone, massive, pebbly, Pocono, to railroad grade | 35 | 0 |

A sample (No. 382R) was collected from No. 5 of section, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. At this point there is transportation, abundance of raw material, water, and sufficient level ground along the Blackwater below the railroad for building purposes, and the site would seem almost ideal for the manufacture of Portland cement or agricultural lime on a large scale.

## Rosendolph Heirs Limestone Exposure and Quarry.

In point between Blackwater and Dry Fork Rivers, just east of Hendricks.

| | | Ft. | In. |
|---|---|---|---|
| 1. | Concealed and red shale, Mauch Chunk..... | | |
| 2. | Limestone, concealed, and limestone....... | 85 | 0 |
| 3. | Concealed ................................ | 20 | 0 |
| 4. | Limestone ................................ | 30 | 0 |
| 5, | Concealed ................................ | 20 | 0 |
| 6. | Limestone ................................ | 15 | 0 |
| 7. | Shale, red and limy....................... | 20 | 0 |
| 8. | Limestone ................................ | 5 | 0 |
| 9. | Sandstone, limy........................... | 5 | 0 |
| 10. | Shale, sandy and limy..................... | 20 | 0 |
| 11. | Limestone, hard, gray, cliff (1870′ B.)...... | 70 | 0 |
| | Total ................................ | 290 | 0 |
| 12. | Sandstone, pebbly, Pocono.................. ... | | .. |

Twenty years or more ago a quarry was operated at this exposure by Eugene Johnson, of Hendricks, limestone having been taken from a ten-foot stratum coming about 10 feet above the base of the lower calcareous member. The raw material was burned in a stone draw kiln, 12′x12′ in size, the product having been mostly used for agricultural lime. A sample (No. 415R) was collected from the face of No. 11 of section, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. This locality would be suitable for the manufacture of Portland cement or agricultural lime on a large scale, being situated near the junction of the Western Maryland and Central West Virginia and Southern Railroads, and there being water and building ground available, as well as an abundant labor supply.

## J. P. Scott et al. Limestone Exposure and Quarry.

At the J. P. Scott et al. exposure and quarry, located on the east side of Dry Fork of Cheat River, 1.2 miles southeast of Hendricks, lime was once burned on a somewhat extensive scale, but the industry fell into disuse several years ago, due to unfortunate litigation. An exhaustive investigation of this locality was once made by Dr. G. P. Grimsley, of the Survey Staff, the result of his studies having been published in Volume III of the Survey, pages 519-524, inclusive. Since the volume in question is now out of print and no longer available to the public, his description of the plant is republished in full below, certain parenthetical additions being made by the writer to bring names and other data to date. It should be noted further, however, that Dr. Grimsley's estimates of costs and freight rates, as well as his list of neighboring industrial plants, are now entirely obsolete and should be disregarded.

"About five years ago (probably about 1900) Mr. R. P. Pearson, a civil engineer then in the employ of the Weaver Coal & Coke Company, being impressed with the advantages of a tract of limestone land, one mile from Hendricks on the Dry Fork Railroad (now Central West Virginia and Southern), purchased the same and started a small lime industry, which proved very profitable. Through some difficulties in the company which was organized, the property was thrown into a receiver's hands and the work stopped. While the case has practically been settled the property has not yet been reopened.

"This location is one which possesses special advantages as a cement proposition and affords an opportunity for a single company to nearly control the entire field in this part of the State on account of the topography.

"The stream known as Dry Fork has a narrow valley with steep bluffs at the sides, but where it cuts through the limestone one mile from Hendricks, the east bank has a level flood-plain for a distance of nearly one-half mile, affording sufficient space for the erection of a large plant, and at this point the lime-kilns were erected. The Dry Fork Railroad (now Central West Virginia and Southern) runs along the edge of this space, and a mile away at Hendricks connects with the West Virginia Central & Pittsburgh Railroad (now Western Maryland), which gives a direct route to Baltimore and later will reach Wheeling and the West.

"While the name of the river would suggest an uncertain water-supply, this is not the case, as the river has a considerable volume of water at all times of the year, and by building a dam sufficient water would be available for a large cement mill. The tract, which can be purchased on reasonable terms, contains nearly 500 acres, with limestone, natural cement rock, clay, shale, coal, and timber.

"**Limestone.**—The limestone is of Lower Carboniferous age, known as the Greenbrier, which extends across the State from north to south. Its thickness is unknown, but has been estimated as 400 to 500 feet. Actual measurement of the present outcrop shows 325 feet (thickness is approximately 290 feet; see Hendricks Section, page 121). While the rock varies in composition the greater portion of it is suitable for Portland cement. Near the top of the limestone outcrop is a natural cement rock, which is about 20 or 25 feet in thickness, with the following composition according to the analyses of R. W. Hunt & Co.:

| | No. 1 | No. 2 |
|---|---|---|
| "Lime Carbonate | 32.17 | 38.83 |
| Magnesium Carbonate | 18.36 | 16.30 |
| Silica | 38.93 | 36.60 |
| Iron and alumina | 4.17 | 6.33 |

"The lime quarry was opened 150 feet above the kiln floor, and a twelve-foot face was worked. Forty-five feet lower is an old cave, which is 60 feet deep and limestone to the bottom. At this place, then, a quarry could be opened with a face of 120 feet, but this could be increased above by an additional face of probably 50 feet of good limestone. The slope of the hill in this part of the tract would enable a company to work the quarry into the hill 400 or 500 feet before any expensive removal of cover would be required, and a length of at least 600 feet. There is thus in sight at a conservative estimate 2,000,000 cubic yards of good limestone, which would last a 2,000-barrel plant a couple of centuries. If the estimate is lowered one-half there is still sufficient rock to justify the location of a mill.

"The composition of the limestone taken from sections 40 to 50 feet apart in vertical distance is shown by the following analyses, the first by J. C. Brydon and the second by George P. Maury:

| | Lower. | Upper. |
|---|---|---|
| "Lime carbonate | 92.53 | 89.16 |
| Magnesium carbonate | 2.15 | 1.93 |
| Iron and alumina oxides | 0.58 | 2.43 |
| Silica | 4.74 | 6.86 |
| Total | 100.00 | 100.38 |

"**Shale and Clay.**—Over the limestone on the hill back of the quarry is a mass of red shales, at least 200 feet in thickness (measured 540 feet; see Hendricks Section, page 121), known as the Mauch Chunk Shales. In places these have slipped and form six to ten feet of cover over the limestone on the slopes below.

"The valley below the quarry near the lime-kilns, and the lower slopes of the mountain, are covered with a red clay two to twenty feet in thickness, which has resulted from the weathering of the shales above. The composition of the shale and clay are given in the following analyses by George P. Maury:

| | Shale. | Clay. |
|---|---|---|
| "Silica | 57.88 | 67.10 |
| Alumina | 15.80 | 18.74 |
| Iron oxide | 4.81 | 5.14 |
| Lime carbonate | 16.86 | ..... |
| Lime oxide | ..... | 0.96 |
| Magnesium carbonate | 2.08 | ..... |
| Magnesium oxide | ..... | 0.96 |
| Water | 2.72 | 4.69 |
| Sodium | ..... | 2.40 |
| Total | 100.15 | 99.99 |

"The silica-alumina ratio in the shale is 3.66 and in the clay 3.52, thus coming within the proper ratio limits. Calculating the proper mixtures according to the method given in Chapter XVII, (of Volume III), would give the upper limestone and shale one part of shale to 5.355 parts of limestone, or 100 parts of shale to 535½ parts of limestone. The limestone-clay mixture should be one part of clay to 6.559 parts of limestone, or 100 parts of clay to 656 parts of limestone.

"These materials were tested by Geo. P. Maury, of the Pittsburgh Metallurgical Laboratory, who used nearly the same proportions as calculated above. The following analyses are taken from his report and he classes the cement as high-grade:

| | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. |
|---|---|---|---|---|---|
| "Silica ............ | 23.70 | 22.29 | 22.20 | 22.35 | 22.89 |
| Alumina ......... | 6.42 | 6.39 | 6.72 | 5.51 | 8.00 |
| Iron oxide........ | 1.71 | 1.52 | 2.28 | 2.76 | 2.44 |
| Lime ............ | 67.47 | 67.83 | 67.31 | 65.52 | 63.38 |
| Magnesia ........ | 1.70 | 1.44 | 0.95 | 1.24 | 2.50 |
| Alkalies ......... | ..... | 0.45 | ..... | 0.92 | ..... |
| Sulphur ......... | none | none | 0.26 | 1.69 | ..... |

"No. 1 was made from a mixture of 11 parts of limestone and 2 parts of shale.
"No. 2 was from a mixture of 7 parts of limestone and 1 part of clay.
"No. 3 is an analysis of French Portland cement.
"No. 4 is an analysis of German Portland cement.
"No. 5 is an analysis of an American Portland cement.

"The analyses Nos. 1 and 2, in comparison with the other analyses of well-known grades of cement which stand in high favor, show that good cement can be made from these Hendricks materials.

"**Fuel.**—This locality is near some of the large coal mining centers, and coal could be obtained from these mines at a very low cost. It is not necessary in this proposition to go away from the limestone tract for fuel for power and heat, a feature which adds still more to the value of this location and makes it unique among possible locations, not only in this State, but in this part of the country. On the same tract one finds the cement materials and coal fuel.

"Six hundred and fifty-five feet above the limestone, 875 feet above the present small quarry, or 1,050 feet above the railroad track are found the coal mines, in which the coal reaches 4½ feet. The entry has been driven a couple hundred feet to the northeast and shows a bright, glistening coal, with a roof of black slate filled with plant remains.

"The coal has been opened in three places and is found 220 feet below the 30-foot layer of Pottsville conglomerate at the top of the hill. Another coal is reported at 140 feet above the mine. The section at this place shows a thickness of 580 feet for the Pottsville Series, as compared with 150 to 300 feet in Ohio and Pennsylvania, while the thickness farther south on New River is 1,400 feet.

"This coal has been classified as Clarion in two expert reports, but since the Clarion should come above the conglomerate, this coal could not be that seam. At the time this area was examined the slope of the mountain was covered with dense vegetation, and the rock in the small ravines was concealed by debris, so that a careful inspection could not be made, and the correlation of this coal with those to the south was impossible. Its position can not be far from that of the Nuttall or Sewell seam of the New River Series (coal is the Sewell Seam; see description of J. P. Scott et al. mine, No. 112 on Map II, page 394).

"A timber chute lined with steel plates and 1,200 feet long leads from the coal mine to the incline track, which is 1,500 feet long to the lime-kilns. This incline has steel rails and is connected by side inclines with the quarry. The chute in its steepest slope is inclined at an angle of nearly 45 degrees, and the incline track at an angle of 28 degrees. Both incline and chute are constructed of heavy timbers and could be placed in good repair at very small cost (these are now in very poor condition).

"The coal at the mine has the following composition, according to analysis of the chemist of the Davis Coal and Coke Company:

PLATE XVI.—Looking westward from Backbone Mountain on Leadmine-Thomas road toward northwestern corner of Tucker County across Deer Park and subordinate anticlines. Laurel Ridge in extreme background is capped by Pottsville. Faint hills that follow are Chemung and clear hills in foreground are Catskill. Brushy slope in foreground is Mauch Chunk.

| | Per cent. |
|---|---|
| "Moisture | 0.95 |
| Volatile Combustible Matter | 24.81 |
| Fixed Carbon | 68.16 |
| Ash | 6.08 |
| Total | 100.00 |
| Sulphur | 0.48 |

"The coal is low in sulphur and moisture, and contains 92.97 per cent. of combustible matter. It is a good steam and fuel coal, but its low percentage of volatile matter would probably prevent its use in the rotary kiln, which requires a coal of about 30 per cent. or more volatile matter, though some engineers place the required percentage as low as 25. If the latter figure should prove correct, this coal could be used for burning the cement. The cost of delivery of this coal at plant was only 62 cents per ton, and if it could be used in rotary kilns would make a fuel cost of 6 cents a barrel. Natural gas has been brought by pipe-line to Hendricks, one mile from this location, and could be used in the rotary kilns.

"**Lime Industry.**—The limestone quarry at this point was opened to supply the kilns in the manufacture of lime. There are two nine-foot Coleman steel lime-kilns, and the material for a third. Each has a tested capacity of 350 bushels (of 80 pounds) of lime per day. There are five tanneries and three pulp-mills in this vicinity, making a large demand for lime, which is now supplied from Ohio, Maryland, and Pennsylvania, with a freight cost of 11 to 15 cents a bushel, so that the lime costs in car-load lots 23 to 26 cents per bushel.

"When the plant was in operation it was found that lime could be made and sold at 15 to 18 cents per bushel, with a large profit. Twelve car-loads of lime were made and used by the Parsons paper-and pulp-mills, proving satisfactory in all respects. The large plants in this region use about twelve car-loads of lime a week. There is also an extensive building trade market in this section. The lime industry could be carried along with the cement industry, adding materially to the profits of the company.

"An analysis of the Hendricks lime burned at this plant was made by the Chicago Bureau of Inspection and Tests.

| | Per cent. |
|---|---|
| "Lime oxide | 93.21 |
| Magnesium oxide | 3.18 |
| Iron and alumina oxides | 1.06 |
| Silica | 2.55 |
| Total | 100.00 |

"**Summary.**—This location is almost an ideal cement proposition, with necessary materials for Portland cement tested showing they make a cement equal to the best grades on the market. Coal fuel on the cement land and natural gas a mile distant, good water-supply, building site, and railroad connections, topography which makes this location practically a monopoly on the whole district. Unlimited quantity of raw materials and the great opportunity in lime trade as an addition to the cement industry. A tract with the preliminary development work completed at a cost of $32,000, which can be purchased at a very low cost. This property should not be permitted to go without development, when its advantages are once known by capitalists wishing to secure a large interest on their investment."

The above property has not been operated or repaired since Dr. Grimsley's investigation and the entire equipment is so nearly gone that its complete replacement would be necessary to reestablish the plant. In the matter of fuel natural gas is now beyond reach as the supply is so poor and the cost so high that it could not be successfully used. The limestone, shale, and natural location, so well described by Dr. Grimsley, still remain, as also the transportation, and there is an abundant supply of labor at Hendricks and Hambleton.

### Central West Virginia and Southern Railroad Limestone Quarry.

On Dry Fork of Cheat River just north of the mouth of Laurel Run, 1.6 miles southeast of Hendricks.

| | Ft. | In. |
|---|---|---|
| Limestone, in cut, hard, reddish-gray, quarry rock (125' B.) 10' to | 10 | 0 |

Lime is being quarried at the above exposure by residents for agricultural purposes, the quarry being near the base of the thick bed of hard, pure lime, 75 feet or more in thickness, which comes just above the top of the Pocono Sandstone and is visible at numerous points on both sides of Dry Fork between Hendricks and Moore Siding.

### John Rhodes Limestone Exposure.

On a short western branch of Otter Creek, 2.6 miles northwest of Otter.

| | Ft. | In. |
|---|---|---|
| Limestone, with a few short cemented intervals (2075' B.) | 125 | 0 |

A sample (No. 437R) was collected across the face of the above exposure, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. This exposure is in the lower portion of the Greenbrier but probably does not reach the base which is concealed or under drainage along the creek. From this point to the mouth of Otter Creek there are numerous outcrops of the same series.

### *Limestone Quarries and Exposures, Davis District.*

In Davis District the Greenbrier Limestone outcrops in a semielliptical belt at the bases of Canaan, Brown, and Cabin Mountains at the northern end of the Canaan Valley, but at most points is covered with a deep layer of soil or vegetable debris so that there are few exposures. On the east side of the valley it is visible at a spring at the foot of Cabin Mountain one-fourth mile east of Glade Run and 1.5 miles southeast of its mouth, the elevation of the outcrop being 3170′ L. The portion exposed is probably near the top of the series.

### *Limestone Quarries and Exposures, Dry Fork District.*

In Dry Fork District the Greenbrier Limestone has an abundant exposure. On Otter Creek it is visible at numerous points from the mouth to the point where it goes under drainage four miles up the stream, the thick, basal ledge being mostly under drainage in this region, which is near the axis of the North Potomac Syncline. On Dry Fork above Otter Creek there is an outcrop frequently visible on both sides of the stream from Otter Station to Moore Siding, the base of the ledge being exposed at the limestone spring along the Central West Virginia and Southern Railroad just north of the latter point. Above Moore Siding the outcrop rises rapidly toward the Blackwater Anticline and recedes from the river front, being visible on small tributary streams and mountain benches. Beyond the Blackwater Anticline it descends into the valley of Red Creek, going under drainage just below Laneville. Along or near the anticline it is well exposed in the vicinity of Flanagan Hill (Red Creek P. O.) and farther northeast in the Canaan Valley near Buena, Cortland, and other points. The following quarries and exposures are worthy of notice:

#### G. K. Bonner Limestone Exposure.

On Mill Run of Dry Fork, 1 mile north of Elk.

| | Ft. | In. |
|---|---|---|
| 1. Limestone, hard, gray (2275′ B.) 20′ to....... | 25 | 0 |
| 2. Sandstone, massive, pebbly, Pocono......... | | |

A sample (No. 413R) was collected from No. 1 of section the composition of which is published in the Table of Limestone Analyses at the end of this Chapter.

### Joseph and Albert Mick Limestone Exposure.

On Elklick Run of Dry Fork, from three-fourths to 1½ miles north of Elklick Station.

For details see Elklick Section, page 136; total thickness of series, 28 feet; elevation of basal ledge, 2305′ B.

At the above exposure which extends for a considerable distance along Elklick Run a sample (No. 435R) was collected from the limestone members of the upper 225 feet, and another (No. 436R) from the hard, gray, cavernous portion, comprising the basal ledge, 60 feet in thickness, the composition of both being published in the Table of Limestone Analyses at the end of this Chapter.

### Charles Wolford Limestone Exposure.

On Big Run of Dry Fork, 0.7 mile northeast of Flanagan Hill.

For details see Flanagan Hill Section, page 138; total thickness of series, 255 feet; elevation of basal ledge, 2710′ B.

At the above exposure a sample (No. 441R) was collected from the various limestone members of the series, its composition being published in the Table of Limestone Analyses at the end of this Chapter.

### Jonathan Nelson Limestone Exposure.

On north side of Red Creek, 1.2 miles westward from Laneville; total thickness of series, 430 feet; elevation of basal ledge, 2480′ B.

At the above exposure a sample (No. 457R) was collected from the outcropping portions of the three limestone benches noted in the section, its composition being published in the Table of Limestone Analyses at the end of this Chapter.

### Fred Cooper Limestone Quarry.

In the Canaan Valley, 0.2 mile northeast of Cosner School and 0.8 mile north of Buena.

| | Ft. | In. |
|---|---|---|
| Soil, red........................................ | | |
| Limestone, hard, gray, quarry rock (numerous marine fossils) (3275′ B.)...................... | 10 | 0 |

A sample (No. 439R) was collected from the quarry rock, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. The quarry is 100 feet long and extends into the hill 15 feet, its product being burned for local agricultural lime. The exposure appears to belong near the middle portion of the series.

### C. S. Harper Limestone Quarry.

In the Canaan Valley, 0.2 mile east of Cortland School and 0.7 mile southwest of Cortland P. O.

Elevation of surface outcrop in top of flat ridge, 3220′ B.

At the above point the limestone is quarried from small, shallow pits in the top of a ledge which forms the surface of a smooth ridge, being apparently in the lower portion of the series. A sample (No. 438R) was collected from the most eastern pit, the composition of which is published in the Table of Limestone Analyses at the end of this Chapter. Stone from this quarry was used for macadamizing a portion of the Class "A" Road which passes through the valley.

### Johnson? Limestone Quarry.

In the Canaan Valley, 0.3 mile northeast of Maple Grove School and 1 mile north of Cortland.

| | Ft. | In. |
|---|---|---|
| 1. Soil, red.................................... | | |
| 2. Limestone, hard, gray, quarry rock (3205′ B.). | 5 | 0 |

The above is a small quarry in a ledge that comes near the top of the series, its product having been used for macadam along the highway.

## SUMMARY OF AVAILABLE LIMESTONE.

The following table, prepared on the assumption that limestone may be profitably quarried by open or drift mining for cement purposes, for a distance of 1000 feet into the mountain and that 100 feet of the Greenbrier Limestone may be so used and that its average weight will be 165 pounds per cubic foot, gives a rough approximation of the amount that is available in the county, each side of the larger streams where the series is above drainage being considered as a separate outcrop:

## Quantity of Limestone Available in Tucker County.

| District. | Miles of Outcrop. | Cubic Feet of Limestone. | Short Tons of Limestone. (2000 Lbs.) |
|---|---|---|---|
| Licking | 8 | 4,224,000,000 | 348,480,000 |
| Clover | 7 | 3,696,000,000 | 304,920,000 |
| St. George | 7½ | 3,960,000,000 | 326,700,000 |
| Black Fork | 22 | 11,616,000,000 | 958,320,000 |
| Davis | 8 | 4,224,000,000 | 348,480,000 |
| Dry Fork | 32 | 16,896,000,000 | 1,393,920,000 |
| Totals | 84½ | 44,616,000,000 | 3,680,820,000 |

## TABLE OF LIMESTONE ANALYSES.

The following table gives in compact form the results of chemical tests made on the Greenbrier and other limestones in Tucker County, the samples having been taken in the field by the writer and the analyses made in the laboratory of the Survey by Messrs. Hite and Krak. Following the table are brief references to the horizon and portion of the same sampled, property ownership, locality of outcrop or quarry, and page of the text where described in full, the key numbers being the same as those in the left-hand column of the table. The several analyses from samples taken on the property of J. P. Scott et al., on Dry Fork, 1 mile southeast of Hendricks, are omitted from the table, but are presented in detail in Dr. Grimsley's report on the property, pages 413 to 418 inclusive:

# Table of Limestone Analyses.

| Reference Number | Name of Limestone | Silica ($SiO_2$) | Ferric Iron ($Fe_2O_3$) | Alumina ($Al_2O_3$) | Calcium Carbonate ($CaCO_3$) | Magnesium Carbonate ($MgCO_3$) | Potassium Oxide ($K_2O$) | Sodium Oxide ($Na_2O$) | Phosphoric Acid ($P_2O_5$) | Loss on Ignition | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1...... | Johnstown. | 23.30 | 2.78 | 9.98 | 57.05 | 2.31 | .... | .... | 0.24 | 3.74 | 99.40 |
| 2...... | Hinton... | 6.56 | 1.09 | 1.09 | 88.50 | 1.71 | .... | .... | 0.07 | 0.35 | 99.37 |
| 3...... | Greenbrier | 5.85 | 1.02 | 0.48 | 88.84 | 3.98 | .... | .... | 0.08 | .... | 100.25 |
| 4...... | Greenbrier | 8.10 | 1.24 | 1.51 | 83.33 | 5.33 | .... | .... | 0.05 | 0.19 | 99.75 |
| 5...... | Greenbrier | 15.50 | 1.20 | 2.26 | 76.60 | 4.59 | .... | .... | 0.05 | .... | 100.20 |
| 6...... | Greenbrier | 11.74 | 0.92 | 0.99 | 83.01 | 1.17 | 0.33 | 0.40 | 0.08 | 1.05 | 99.69 |
| 7...... | Greenbrier | 11.25 | 0.84 | 2.62 | 81.58 | 0.72 | 0.45 | 0.67 | 0.10 | 1.60 | 99.83 |
| 8...... | Greenbrier | 4.92 | 0.73 | 0.65 | 91.23 | 1.10 | 0.35 | 0.48 | 0.07 | 0.82 | 100.35 |
| 9...... | Greenbrier | 9.31 | 0.84 | 0.94 | 85.18 | 1.06 | 0.34 | 0.41 | 0.08 | 1.42 | 99.58 |
| 10...... | Greenbrier | 13.04 | 1.24 | 2.24 | 79.51 | 3.88 | .... | .... | 0.04 | .... | 99.95 |
| 11...... | Greenbrier | 5.55 | 1.02 | 0.82 | 89.77 | 1.53 | .... | .... | 0.04 | 0.72 | 99.45 |
| 12...... | Greenbrier | 5.84 | 0.88 | 0.97 | 91.02 | 0.76 | .... | .... | 0.05 | 0.48 | 100.00 |
| 13...... | Greenbrier | 5.86 | 0.84 | 1.11 | 88.47 | 1.23 | 0.38 | 0.45 | 0.25 | 1.02 | 99.61 |
| 14...... | Greenbrier | 5.85 | 1.02 | 1.37 | 90.44 | 2.16 | .... | .... | 0.05 | .... | 100.89 |
| 15...... | Greenbrier | 2.69 | 1.02 | 0.07 | 95.01 | 1.24 | .... | .... | 0.03 | .... | 100.06 |
| 16...... | Greenbrier | 2.39 | 0.95 | 0.25 | 96.01 | 0.83 | .... | .... | 0.02 | .... | 100.45 |
| Average | Greenbrier. | 7.70 | 0.98 | 1.16 | 87.14 | 2.11 | 0.37 | 0.48 | 0.07 | 0.91 | 100.00* |

*Average of totals. Total of averages==100.92.

1. Johnstown Limestone, W. Va. Central & Pittsburgh Railway, North Fork of Blackwater River, 0.5 mile south of Coketon, Fairfax District; described on page 188.
2. Hinton Limestone, Charles Wolford, Big Run of Dry Fork, 1 mile N. E. of Flanagan Hill, Dry Fork District; described on page 229.
3. Greenbrier Limestone (Lower portion), Wm. Cupp, on Limestone Mountain, 0.3 mile west of Limestone Church, Licking District; described on page 409.
4. Greenbrier Limestone (lower portion), Ernest Adams, on Limestone Mountain, 1 mile S. W. of Limestone Church, Licking District; described on 410.
5. Greenbrier Limestone (lower portion), Albert Loughridge, Licking Creek, 1.1 miles south of Tucker-Preston-Barbour corner, Licking District; described on page 410.
6. Greenbrier Limestone (lower portion), N. J. Pennington, Roaring Run of Dry Fork, 2 miles northeast of Hendricks, Black Fork District; described on page 412.
7. Greenbrier Limestone (lower portion), George Davis, Blackwater River, 2 miles northeast of Hendricks, Black Fork District; described on page 412.
8. Greenbrier Limestone (lower portion), Rosendolph Heirs, between Blackwater and Dry Fork Rivers, just east of Hendricks, Black Fork District; described on page 413.
9. Greenbrier Limestone (lower portion), John Rhodes, branch of Otter Creek, 2.6 miles N. W. of Otter, Black Fork District; described on page 418.
10. Greenbrier Limestone (lower portion), Mill Run of Dry Fork, 1 mile north of Elk, Dry Fork District; described on page 419.
11. Greenbrier Limestone (upper portion), J. and A. Mick, Elklick Run of Dry Fork 1.3 miles north of Elk, Dry Fork District; described on page 420.
12. Greenbrier Limestone (lower portion), J. and A. Mick, Elklick Run of Dry Fork, 0.8 mile north of Elk, Dry Fork District; described on page 420.
13. Greenbrier Limestone (entire portion), Charles Wolford, Big Run of Dry Fork, 0.7 mile N. E. of Flanagan Hill, Dry Fork District; described on page 420.
14. Greenbrier Limestone (entire portion), Jonathan Nelson, Red Creek, 1.2 miles West of Laneville, Dry Fork District; described on page 420.
15. Greenbrier Limestone (middle portion), Fred Cooper, Canaan Valley, 0.8 mile north of Buena, Dry Fork District; described on page 420.
16. Greenbrier Limestone (lower portion), C. S. Harper, Canaan Valley, 0.7 mile S. W. of Cortland, Dry Fork District; described on page 421.

# CHAPTER XV.

## WATER-POWER, MINERAL WATERS, IRON ORE, PRECIOUS METALS, AND FORESTS.

### WATER-POWER.

#### AVAILABLE STREAMS.

Little attempt has been made to utilize the streams of Tucker for hydroelectric power, the only instance being the grain mill at Parsons which generates electric current for lighting the town. Many water-wheel mills have been built at other points along some of the rivers and creeks for grinding grain and sawing lumber and some of these are still in operation. Comprehensive investigations, however, of the hydroelectric possibilities of some of the rivers have been made by private corporations, but all these projects are now in a state of abeyance. The streams worthy of attention for commercial power development are Cheat River, Shavers Fork and Dry Fork of the same, and Blackwater River. Gage readings are available for Cheat River at the Moss Bridge, two miles below Parsons; Shavers Fork at Parsons; and Black water River at Hendricks. These records have already been published under the descriptions of the drainage basins, pages 26–39, 42–59, and 65–74, respectively.

All of the rivers mentioned above offer superior natural advantages for economic power development. Cheat River below Parsons, Shavers Fork, and Dry Fork have all cut their channels deep into the Mississippian or Devonian Rocks below the coal measures so that no coal mining rights would be interfered with, even with dams of extreme height, and the mountainous character of most of their drainage basins insures that a large percentage of wooded land on the headwaters and tributary streams will be preserved, making the run-off more even than would otherwise be the case. On Dry Fork above Hendricks there is valuable limestone just above drainage for a distance of four miles, but any projected system must necessarily be so planned that dams would not flood this outcrop, as the limestone is cavernous and the water could not be held. Dams could be built above Moore Siding, however, where the limestone is higher, and a considerable portion of the power could be utilized by the cement industry of the lower valley that will come in time, as well as by the present important industries at Hendricks, Hambleton, and Parsons, thus affording a partial local consumption without appreciable loss of current through long transportation by cable.

On the Blackwater River the coal measures are entirely above drainage below the mouth of North Fork, being so high that they would not be troublesome. From North Fork to a point 2½ miles above Davis, a distance of 7 miles, they are partly under drainage but it is extremely doubtful whether any coal of minable thickness is present, either under the river bed or above drainage near enough to the river to interfere with any water-power project. On all that portion of the river, however, below the Falls of Blackwater, two miles below Davis, the fall of the stream is so rapid that dams would impound the water for only short distances, affording little opportunity for equalizing the supply at seasons of depressed flow. At the Falls of Blackwater there is a vertical drop of 57 feet. The rocks at this point are the hard, durable ledges of the upper portion of the Pottsville and any structure built upon them would have a secure foundation. It would be entirely feasible to carry water by closed flume from the falls westward to the mouth of North Fork, a distance of approximately 2½ miles, there being no serious topographic obstacles along the way, thereby securing the advantage of a 600-foot head and giving a pressure at the turbine that would generate enormous power. On the same river two or three miles above Davis there is a comparatively narrow gorge near the point where the base of the Pottsville Series emerges above drainage on the southeastward rise of the rocks that could be utilized for a storage dam. Such a dam, if built to a height of 125 feet, would flood almost the entire Canaan Valley and would afford a storage reservoir of great magnitude. The Greenbrier Limestone outcrops over a considerable portion of the valley but the land is generally marshy and it does not seem probable that caverns or fissures exist that would carry off any considerable portion of the water. The great quantity of water so gathered could be utilized by a power plant at the dam or at some other selected point farther down the river, insuring equality of flow.

### INDICATED HORSE-POWER OF STREAMS.

The following table, showing indicated horse-power developed by streams flowing through the county, is compiled from Tables 13 and 14, pages 420-421, of the Semi-Centennial History of West Virginia, by Dr. J. M. Callahan, the table in question being part of a special article on "Water-Power Resources" by A. H. Horton, District Engineer, Water-Resources Branch, U. S. Geological Survey:

## Indicated Horse-Power Developed by Cheat River and Tributaries.

| Stream | Section of River | | Length. Miles. | Mean Drainage area. sq. mi. | Minimum Discharge. Second-feet. | Assumed Discharge for maximum development Sec.—feet. | Total Fall. Feet. | Minimum Horse-power. | Assumed Maximum Development. Horse-power. | Horse-power available from storage for | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | | | | | 12 months | 6 months | 3 months |
| Cheat River...... | Source ......... | 3,000-ft. Contour. | 30 | a 88 | 24 | 59 | 1,500 | 826 | 2,030 | ....... | ....... | ....... |
| Cheat River...... | 3,000-ft. Contour. | Above Dry Fork.. | 45 | 151 | 41 | 101 | 1,370 | 5,160 | 12,700 | ....... | ....... | ....... |
| Cheat River...... | Below Dry Fork.. | Albright ....... | 45 | 865 | 151 | 454 | b 440 | 6,120 | 22,100 | 21,100 | 42,200 | 84,400 |
| Totals...... | ............... | ............... | 120 | ...... | ...... | ...... | 3,310 | 12,106 | 36,830 | 21,100 | 42,200 | 84,400 |
| Dry Fork........ | Source ......... | Above Laurel Fork | 28 | a 145 | 39 | 97 | 2,200 | 2,060 | 5,130 | ....... | ....... | ....... |
| Dry Fork........ | Below Laurel Fork. | Cheat River..... | 13 | 345 | 94 | 232 | 490 | 3,410 | 8,550 | ....... | ....... | ....... |
| Laurel and Glady Forks... | Source ......... | Dry Fork ....... | 24 | a 123 | 33 | 83 | 1,800 | 1,370 | 3,440 | ....... | ....... | ....... |
| Blackwater River. | Source ......... | Cheat River..... | 28 | a 100 | 27 | 67 | 1,000 | 621 | 1,540 | ....... | ....... | ....... |
| Totals........... | ............... | ............... | ...... | ...... | ...... | ...... | ...... | 7,461 | 18,660 | ....... | ....... | ....... |

a Total area. b Fall reduced to 280 feet by proposed Cheat River reservoir.

## MINERAL WATERS.

### SALT WATER WELLS.

Little is known of the underground salt water resources of the county, only one well having been drilled to a depth at which it might be expected. In the Parsons Pulp & Lumber Company deep well at Parsons, no salt water is recorded except in the Oriskany Sandstone, where a salt brine was found at a depth of 3990-4000 feet, its quantity being estimated by officials of the company as 8 to 10 barrels daily, and its mineral content being reported as 33 per cent. Owing to its small quantity no attempt was made to utilize it.

### LIMESTONE SPRINGS.

Along the outcrop of the Greenbrier Limestone there are many large springs flowing from caverns or fissures in the lime, the largest of which occur near its contact with the hard Pocono Sandstone just beneath it. Conspicuous among these are the Big Springs, located on a branch of Elklick Run of Dry Fork, just west of Big Springs Gap of McGowan Mountain and 3 miles southward from Hambleton, where there is a large and constant flow of water, and the spring along the Central West Virginia and Southern Railroad just north of Moore Siding. At the latter spring, where there is an estimated flow of 3,000 gallons per hour, it is reported that green vegetation often comes from the opening at times of excessive rainfall, indicating that a considerable portion of the water comes through fissures in the lime from the region of its higher outcrop on Mill Run and other tributaries of Dry Fork. These limestone springs have no known medicinal qualities other than that afforded by their slight alkalinity, but their presence in great number affords the larger portion of domestic water-supply for residents living on the outcrop of the lime.

## IRON ORE.

Iron ore is almost totally absent in the county. In the shales of the Pennsylvanian Period there are occasional concretions of iron carbonate or ferruginous limestone but these occur in such slight quantity that they offer no hope of possible ore. The red shales of the Mauch Chunk and Catskill Series of the Mississippian and Devonian Periods, respectively, contain from 5 to 10 per cent. of ferric iron. The aggregate of iron is large but its lack of concentration into rich deposits renders it useless as a source of commercial ore.

## PRECIOUS METALS.

### GENERAL STATEMENT.

There is a wide-spread belief among many residents that Tucker County contains precious metals of commercial value, including manganese, copper, lead, and silver. A considerable amount of exploratory prospecting has been done, resulting in the acquisition of numerous hand specimens of supposed ore, many of which are reported to have been assayed in commercial laboratories with results that, in some cases, have encouraged the prospectors. In order to obtain first-hand information as to the value of these supposed deposits the writer visited the principal prospects and collected samples from them which have been analyzed in the laboratory of the Survey. The results show that there are occasional traces of copper, fractional percentages of lead, and a small amount of manganese, but no silver is reported by the analyst. The various exposures and prospects of manganese, also, offer no hope of commercial exploitation, but all of these various deposits are of scientific interest because they reveal in part the geologic history of the rocks of the county.

As a brief explanation of precious metal deposits it may be stated that lead, copper, silver, gold, and other elements of this class are found only in regions where igenous intrusions have forced masses of molten or plastic material from great depths through the comparatively recent mantle of sedimentary deposits. In these intrusions, commonly quartzitic or granitic in character, the metals are found in irregular veins or fissures, and are often subsequently concentrated into richer deposits by slow natural processes in which hot waters or hot gases containing acidic solutions carry the dissolved ores into a medium that is favorable for their deposition and retention. In Tucker County there are no intrusive masses of this character, as the surface rocks are entirely unaltered sedimentaries. That being the case the absence of commercial deposits of the class of metals mentioned could have been foretold without the aid of a chemist. To use a figure of speech, peaches may not be gathered from a chestnut tree, nor may the precious metals be mined in profitable quantity from sedimentary deposits unless carried there from near-by veins or intrusions. In a large proportion of the sedimenary rocks of the world, however, traces of the rich metals may be found, due to the fact that the stratified beds are usually derived from mountain masses in which igneous masses occur, the contents of which have been widely scattered in the process of erosion and sedimentation, rendering them of no value on account of their lack of concentration.

Manganese, on the other hand, is almost entirely of secondary origin, being carried by circulating waters for long distances, and often concentrating from decomposed shales into clays or other favorable sedimentary beds. Its presence in the stratified beds of Tucker County, therefore, is possible from a theoretic standpoint, but as a matter of fact commercial deposits of manganese are not known to occur in the belt of West Virginia counties along the northwestern fringe of the Alleghany Mountains of which Tucker is a part. Farther southeast, in the Blue Ridge Mountains of West Virginia and Virginia, manganese is of much more abundant occurrence and it has been successfully mined in the latter State.

### OCCURRENCE OF SUPPOSED METALLIFEROUS ORES.

Two general localities have been prospected in Tucker County for metalliferous deposits. In certain portions of Dry Fork District there is a cherty band, sometimes 2 to 5 feet in thickness, occurring at the contact between the Greenbrier Limestone and Pocono Sandstone of the Mississippian Period, in which there are certain lustrous incrustations commonly believed to be silver or lead. In the northwestern districts of the county, there are occasional small flakes of lead or copper, occurring in minute, slightly quartzitic fractures in the thin sandstones near the base of the Chemung Series of the Devonian Period. In the same region some prospecting for manganese has been done in the soft shales of the Chemung and more recent beds.

### *Metal Prospects and Exposures, Licking District.*

In Licking District some prospecting has been done for manganese, a sample having been submitted to the Survey by Ed. Wilson, of Morgantown, West Virginia, collected from a pit on the land of Joseph Davis, described as being in Tucker County on Cheat River, three miles below Hannahsville, the material being 20 feet above river level and 6 to 8 inches thick. At the locality named, which might possibly be in Preston County instead of Tucker, judging from its reported distance from Hannahsville, the Hendricks Sandstone of the Chemung Series is just above drainage and the sample must have come from shales just above or below it. According to Messrs. Hite and Kaplan, the sample contains 73.26 per cent. of silica and 11.78 per cent. of manganous oxide ($MnO_2$). This would give approximately 7½ per cent. of metallic manganese, as contrasted with the 40 to 60 per cent. content of commercial ores.

### *Metal Prospects and Exposures, Clover District.*

In Clover District a prospect for manganese has been made on the land of Andrew Wilt, near his residence at the head of a small ravine entering Clover Run, the opening being 1.2 miles southwest of St. George. The excavated material consists of dark shale, with flakes of mica and minute particles of manganese, coming in the Chemung Series about 700 feet below the horizon of the Hendricks Sandstone, the elevation of the drift being 2020′ B. A sample (No. 445R) was collected from the dump, which contains, according to Hite and Kaplan 0.10 per cent. of manganous oxide ($MnO_2$). or little more than a trace.

### *Metal Prospects and Exposures, St. George District.*

In St. George District, Mr. John H. Fansler and his son, Wm. P. Fansler, have prospected for copper in the bed of Lick

Drain of Horseshoe Run, 0.4 mile above its mouth, and 0.5 mile southwest of Lead Mine village, the locality being just west of the Deer Park Anticline, and having an elevation of 1830′ B. and being near the base of the Chemung Series. A sample of the ore (No. 416R) handed to the writer by Mr. John H. Fansler, is reported by Hite and Kaplan as containing 0.40 per cent. of copper. Two other samples (Nos. 417R and 418R) collected by the writer at the prospect, consisting of slightly colored, quartzitic, slickensided material occurring in fissures of the rocks, are reported by the same authorities as containing no copper, no further qualitive test having been made.

On Drift Run of Horseshoe Run, Mr. J. W. Lipscomb has done some prospecting on the lands of the Kendall Lumber Company, the property being better known as the Rufus Maxwell Estate, and with his assistance the writer collected a sample (No. 419R) of a lustrous incrustation on a sandstone from near the base of the Chemung Series in the bed of the run, 0.4 miles above its mouth and 2.8 miles southwest of Lead Mine. According to Hite and Kaplan, the sample contains no copper, and it is probably iron pyrites. This locality is just east of the Deer Park Anticline. On the left-hand fork of Drift Run, approximately 0.2 mile from the forks, 1 mile northward from the mouth of the main run and 2.4 miles southwest of Lead Mine, two samples (Nos. 420R and 421R) were collected in the bed of the stream from a thin quartzitic vein coming between the thin-bedded sandstones of the lower portion of the Chemung. Sample No. 420R was recognized as lead sulphide, and according to the chemists, contains 0.55 per cent. of lead. Sample No. 421R, which was a yellow incrustation thought to be copper by Mr. Lipscomb, was evidently iron pyrites, as the analysis showed no copper present. Farther down the main run, however, at a distance of about 400 feet below the forks, a loose fragment of stone, probably washed from the outcrop above, and coated with material of similar appearance, was collected as a sample (No. 422R) and is reported by the chemists as having a trace of copper. At all the localities where collections were made along this run, the rocks are highly disturbed, standing at angles that vary from 60 to 75 degrees, and contain frequent quarzitic veinlets between the bedding-planes.

### *Metal Prospects and Exposures, Black Fork District.*

In Black Fork District, Mr. Frank Frederick, of Bretz, Tucker County, has prospected certain material coming in the lower portion of the Chemung Series at an eastern bend of Cheat River, about 600 feet north of the mouth of Devils Dump Run and approximately 1 mile above the Moss Bridge. At this locality, just east of the river the following exposure was noted, there being a southeastward dip of 30 degrees:

| | Ft. | In. |
|---|---|---|
| 1. Sandstone, cliff rock alternating with streaks of shale (estimated) | 150 | 0 |
| 2. Sandstone, shaly, with quartzitic veinlets between bedding-planes, to river (1610′ B.) | 5 | 0 |

In the quartzitic veinlets of No. 2 of section there are incrustations of lead sulphide, a sample (No. 448R) which was collected on the property of Lee Stout and others showing 0.29 per cent. of lead, according to Hite and Kaplan. Mr. Frederick states that some small nuggets of gold have been found at the same exposure and exhibited a small, flat specimen, mounted as a scarf-pin which he says came from this outcrop. An extensive search with his assistance, however, failed to find any gold.

Along the Western Maryland Railway at Bretz, 0.2 mile east of the viaduct across Dry Fork of Cheat River, there are incrustations on the base of a sandstone of the lower Chemung that have the appearance of lead sulphide, but a sample (No. 447R), collected at the railroad grade level, is reported by Hite and Kaplan as having no lead present. According to Mr. S. R. Blackman, of Bretz, a heavy blast was discharged at this point when the railroad was under construction, revealing mineral that had the appearance of being lead or silver. Some samples were sent to Wheeling, West Virginia, by the track foreman, no report being available on the assay, if one were made. Since that time the hole has been filled up and no further prospecting has been done. The failure to find lead in the sample collected by the writer would tend to the belief that this material might be antimony or some other similar sulphide, its quantity in any case being so slight that no hope of commercial exploitation would be justified.

### *Metal Prospects and Exposures, Dry Fork District.*

In Dry Fork District, Mr. J. B. Lambert, Sr., formerly of Hendricks, West Virginia, but now residing at Kenton, Ohio, has prospected the cherty contact zone between the Greenbrier Limestone and Pocono Sandstone at his property on the headwaters of Big Run of Dry Fork about 1½ miles southeast of Elklick Station. A hand specimen of quartz (No. 442R), furnished by him and containing gray, lustrous material, was analyzed by Mr. Kaplan, no lead being reported present.

On the land of Martin White, on the south side of Big Run, 1.6 miles southeast of Elklick Station, the following exposure of the Greenbrier-Pocono contact zone was noted:

| | Ft. | In. |
|---|---|---|
| Limestone, gray, hard | 30 | 0 |
| Chert ledge, 1′ to | 2 | 0 |
| Limestone, at spring (2500′ B.) | 5 | 0 |
| Sandstone ledge, Pocono | | |

Another exposure on the same property and on the same side of Big Run, 1.5 miles southeast of Elklick Station, shows the following:

| | Ft. | In. |
|---|---|---|
| 1. Limestone, gray, hard, Greenbrier | .. | .. |
| 2. Chert, limy, with gray, lustrous incrustations (2505′ B.) 3′ to | 4 | 0 |

A sample (No. 443R) was collected from the lustrous material from No. 2 of section, but Mr. Kaplan's analysis shows that no lead is present.

On the west side of Scott Run of Dry Fork, 0.8 mile north of Scotts Siding, a sample (No. 444R) was collected from material dug out at a shallow water well on the land of William Devilders, coming apparently from the same Greenbrier-

Pocono contact zone at an elevation of 2550′ B., and having the same appearance as the material from the White farm. This sample, also, is reported by Hite and Kaplan as barren of lead. It would appear from the above analyses that the metalliferous deposit in the chert of this locality is probably antimony or some other sulphide of similar appearance.

## FORESTS.

In Volume V, page 280-282, of the State Survey Reports (1911), by A. B. Brooks, State Forester, there is a description of the "Original Timber Conditions" of Tucker County that is of pertinent interest, not only because of its historical value but also because of the fact that the list of species therein contained is the best indication of the trees that should thrive when reforestation is seriously taken up. It is accordingly republished in full below:

### ORIGINAL TIMBER CONDITIONS.

"The greatly diversified character of the Tucker County area, with its rich river bottoms, its lofty plateaus and mountains, together with its unusual range of altitude, fits it for the existence of a remarkable forest growth. 'When the old pioneers first settled the bottom lands along the river, they found there the most gigantic oaks, hickories, walnut, and other timbers.'[1] The 'other timbers' here mentioned would include such trees as the yellow poplar, basswood, white ash, sycamore, sweet buckeye, and the birches, maples, and others usually associated with them. Hemlock, the most abundant timber of the county, grew in nearly all sections. White pine grew plentifully on Horseshoe Run, Upper Dry Run, Mill Run, and Clover Run, as well as on the southern exposures along Haddix Creek and on benches and faces of the Cheat River hills from Hendricks to St. George. It was found in greatest abundance on Horseshoe Run, up which it extended for a distance of not less than 7 miles. The original stand of white pine in Tucker County was probably not far from 15 to 20 million feet. West of Backbone Mountain the land was well timbered in sugar maple forming what was called the 'Sugar Lands.' Large areas of red spruce once existed in the county. These lay on the high mountains in the southern part and eastward from Backbone Mountain, covering most of the higher land of the eastern half of the county. If we approximate the original stand of all timber at 5,000 feet to the acre, the county must have contained almost a billion and a half feet. The principal species of timber trees of Tucker County are given below with percentages to show their relative abundance:

[1]Maxwell's History of Tucker County, p. 139.

| | |
|---|---|
| "Hemlock | 20 per cent. |
| Red Spruce | 10 per cent. |
| Yellow Poplar | 10 per cent. |
| Sugar Maple | 10 per cent. |
| Beech | 12 per cent. |
| White Oak, Red Oak, Chestnut Oak, Black Oak, Scarlet Oak | 15 per cent. |
| Chestnut | 7 per cent. |
| Hickory | 3 per cent. |
| Sweet Birch, Yellow Birch | 2 per cent. |
| White Ash | 1 per cent. |
| Black Walnut | 1 per cent. |
| Black Cherry | 1 per cent. |
| Red Maple, Black Gum, Basswood, Cucumber, Locust, Sycamore, Sweet Buckeye, Slippery Elm, White Walnut, Black Ash, Balsam Fir | 4 per cent. |

"These percentages can be applied to the present stand except that the white pine has practically all been removed and the yellow poplar, red spruce, hemlock, and all the valuable oaks greatly reduced. This has had the effect of raising the percentages of the less valuable timbers such as the beech, birch, and maple."

### PRESENT TIMBER CONDITIONS.

In sharp contrast to the original timber conditions described by Mr. Brooks there now remain in the county only a few thousand acres of virgin timber, and some additional areas where the prime trees have been removed, leaving a considerable amount of merchantable material. In Licking and Clover Districts there are numerous small tracts of this latter type of forest along Cheat River and some of its tributaries, principally hardwood. In St. George District there is a considerable body of nearly virgin hardwood on the waters of Horseshoe Run which is now being rapidly cut and hauled by logging trains to the mill of the Kendall Lumber Company at Crellin, Maryland. In Black Fork District there is a comparatively small body of hemlock and spruce on Shavers Fork of Cheat River just north of the Randolph County Line that is now being cut and hauled to the mill of the Porterwood Lumber Company, at Porterwood. Elsewhere in the district there are some scattered areas of cut-over woodland that have some timber of value, but for the most part the land is practically barren. In Fairfax and Davis Districts there is scarcely an acre of any kind of timber, the entire original growth having been removed and subsequent forest fires having almost completely razed the smaller trees. In Dry Fork District there is a comparatively small acreage of hemlock, spruce, and hardwood along the southeastern segment of the Canaan Valley, which is now being cut and hauled to the mill of the Babcock Lumber and Boom Company at Davis. Elsewhere in the district the land is mostly cut-over and has since been devastated by fire.

## NATIONAL FORESTS.

In recent years the United States Government has established the **Monongahela National Forest**, embracing certain lands that are largely on the waters of Dry Fork of Cheat River in Tucker County. No map of its boundaries is available but the following list of the various properties contained in it, as given by H. L. Johnson, Supervisor, of Elkins, West Virginia, in notices regarding grazing permits for the summer of 1919, will be of interest:

| Properties. | Acres. |
|---|---|
| Bridges Estate | 18,000 |
| T. J. Arnold | 7,000 |
| D. E. Lutz | 550 |
| C. Ed. Long | 225 |
| J. A. Cunningham | 462 |
| Otter Creek Boom & Lumber Company | 18,552 |
| Hurry & Schoonover | 1,357 |
| Total | 46,146 |

The Bridges Estate is located principally on the waters of Red Creek, near Laneville; the T. J. Arnold land is mainly on Elklick Run, tributary to Dry Fork at Hambleton; the C. Ed. Long property is on Shavers Mountain south of Richford; the Otter Creek Boom & Lumber Company tract is mainly on Otter Creek, including portions of Green and McGowan Mountains. The locations of the Lutz, Cunningham, and Hurry & Schoonover lands are unknown.

All of this reserve has been cut over and later much of it has been razed by forest fires so that most of the accumulated vegetable humus has been destroyed. On Green and Mc-

Gowan Mountains, the histories of which are familiar to the writer, the virgin forest was largely spruce and hemlock. After these species had been removed and the land had been burned over, a heavy growth of blackberries and wild cherries sprang up, but after an interval of 15 years these are now being almost entirely replaced by an exceedingly thick growth of birch, scarcely any hemlock or spruce having appeared. On the waters of Red Creek, where the original timber was removed at a much later date than that on Green and McGowan Mountains, the vegetation is now at the blackberry and wild cherry stage.

### FOREST PROTECTION SERVICE.

On the Monongahela National Forest an efficient patrol system is in effect, paths being cut through the underbrush which are daily traversed by scouts during the dry season in spring and fall when fires are most apt to occur. Private areas of wooded land in the county are largely protected by the Central West Virginia Fire Protective Association, a semi-official organization, supported in part by State and Government funds, but mainly by private assessment based on acreage, Mr. W. F. Lipscomb, an experienced woodsman, of Parsons, being in charge of the local agency. On McGowan Mountain, a lookout tower has been erected at the former location of the Government triangulation point, the observer at which gives prompt notice by telephone of any fires within his range of vision, together with their location as determined on the topographic map at the tower, and patrols are also kept on the lands of the subscribers to the fund. The work of this organization, in conjunction with the protection afforded by the Government, has reduced the fire hazard of the county to a minimum and has saved the landowners and taxpayers many times the cost of the service.

### LUMBER MILLS.

A small percentage of the lumber industry of the county is being conducted by small, portable sawmills, no account of which is available. The folowing are the principal mills and wood-working plants:

**Babcock Lumber and Boom Company.**—The plant of the Babcock Lumber and Boom Company, located at Davis, has been previously described, page 17, along with the description of other industries at Davis.

**Hendricks Handle Company.**—The Hendricks Handle Company, located at Hendricks, has already been described under the account of the town and its industries, page 15.

**Kendall Lumber Company.**—The Kendall Lumber Company, of Pittsburgh, Pennsylvania, having one of its principal mills at Crellin, Garrett County, Maryland, is now cutting lumber on the headwaters of Horseshoe Run, St. George District, hauling the logs to Crellin over the Preston Railroad, but maintains no mill in Tucker County.

**Laurel River Lumber Company.**—The Laurel River Lumpany, with head office and mill at Jenningston, was established in 1909, having taken over the mill built by Jennings Brothers in 1900. According to J. H. Babb, Assistant General Manager, this concern manufactures both hard- and soft-wood lumber, its capacity being 100,000 feet B. M. daily, a portion of the product being made into finished material at the mill, and the equipment including a double-band saw outfit. The timber comes from a 15,000-acre tract on Laurel Fork of Dry Fork of Cheat River, principally in Randolph County, the logs being hauled to the mill on the standard-gauge railroad of the company, having 27 miles of trackage, the amount of raw material on hand in 1919 being sufficient to keep the mill in operation for two years. Three hundred men are employed, including the mill, railroad, and woods gangs, of whom 25 to 30 are skilled laborers, the monthly pay-roll being $25,000 to $30,000.

**Parsons Pulp & Lumber Company.**—The plant of the Parsons Pulp & Lumber Company, located at Parsons, has been previously described, page 13, under the general account of Parsons and its industries.

**Porterwood Lumber Company.**—The Porterwood Lumber Company, with head office and mill at Porterwood on Shavers Fork of Cheat River, two miles southwest of Parsons, was established in 1913. According to Charles Buchanan, Bookkeeper, this concern manufactures hard- and soft-wood lumber, lath, etc., its daily capacity being 30,000 feet B. M., the equipment including a single-band mill. The raw timber comes from Shavers Fork of Cheat River, partly in Tucker and partly in Randolph County, the logs being hauled to the mill on the standard-gauge railroad of the company, having 12 miles of trackage. Ninety-one men are employed, of whom 20 to 25 are skilled laborers, the monthly pay-roll being $8,000.

**West Virginia Pulp & Paper Company.**—The plant of the West Virginia Pulp & Paper Company, located at Davis, has already been described on page 17, under the general account of Davis and its industries.

# CHAPTER XVI.

## CLAY, BUILDING STONE, AND ROAD MATERIAL.

### CLAYS AND CLAY INDUSTRY.

#### PRESENT LACK OF DEVELOPMENT.

No clay industry exists in Tucker County at the present time. There are no brick or tile plants, and so far as known no attempt has ever been made to start them, although there is an abundance of raw material suitable for both purposes. In the region between Parsons and St. George, river clays of the Cheat Valley have occasionally been used to burn brick for local buildings by means of temporary kilns, but since the advent of railroad transportation all brick has been imported from other counties. The great abundance of cheap lumber, available during the period when the principal building of homes in the county occurred, has no doubt retarded the general use of brick for residential purposes.

#### AVAILABLE CLAY AND SHALE.

*Transported Clay.*

Along the valley of Cheat River in the vicinity of Parsons and at numerous other points farther down toward the Preston County Line, there are extensive deposits of river clay, varying in thickness from 5 to 25 feet, that are well suited for common building brick, such as will be desired when the increasing cost of lumber will preclude its use as a building material. Some of this clay occurs along the flood-plain of the river and some of it is in the form of terrace material at higher levels. On Shavers Fork of Cheat there are much less extensive beds of river and terrace clay and on Dry Fork the same statement is true. On the Blackwater River most of the terrace clays have been removed by erosion and flood-plain material is mainly limited to the section within two miles of its mouth, these deposits being sandy and of doubtful value. In Chapter I, page 80, there is a list of the principal terraces, some of which, however, contain too much sand and gravel to be made into brick. On Map II the flood-plain and terrace deposits are shown in yellow, under the general title of Alluvium, from which the most extensive occurrences may be easily inferred.

Near Scotts Siding on Dry Fork River there is a clay that has caused local attention. The following exposure was noted just opposite the siding in Tucker County, on the land of Wilbert White:

| | Ft. | In. |
|---|---|---|
| 1. Loose sand and gravel...................... | 25 | 0 |
| 2. Clay, very plastic, gray, streaked with red (2115′ B.).................................. | 3 | 0 |
| 3. Gravel and concealed, to river............... | 3 | 0 |

Only a small amount of the gray clay is visible at this point, having evidently been leached and washed into place by the river.

On the same side of the river, 0.2 mile farther southeast, there is a much larger body of similar clay on the same property, the following measurement having been made:

| | Ft. | In. |
|---|---|---|
| 1. Soil ........................................ | | |
| 2. Clay, yellowish-red (2150′ B.)................ | 15 | 0 |
| 3. Soil and concealed, to Dry Fork............. | 40 | 0 |

On account of its position 40 feet above river level the latter outcrop appears to be a remnant of an old terrace deposit rather than recent material. The clay at both exposures is probably largely derived from the red shales of the Catskill Series which outcrop for several miles along the river. A sample (No. 461R) was collected from the river clay, No. 2 of the first exposure, and another (No. 462R) from the terrace clay, No. 2 of the second exposure, the analyses of which are reported as follows by Hite and Krak:

| | River Clay. | Terrace Clay. |
|---|---|---|
| Silica ($SiO_2$) | 69.10 | 63.70 |
| Ferric Iron ($Fe_2O_3$) | 3.94 | 4.75 |
| Alumina ($Al_2O_3$) | 13.71 | 15.52 |
| Lime (CaO) | 1.26 | 0.41 |
| Magnesia (MgO) | 0.74 | 0.33 |
| Potassium Oxide ($K^2O$) | 2.55 | 2.20 |
| Sodium Oxide ($Na_2O$) | 1.18 | 1.57 |
| Titanium Oxide ($TiO_2$) | 0.65 | 0.36 |
| Phosphoric Acid ($P_2O_5$) | 0.07 | 0.07 |
| Moisture | 2.98 | 6.22 |
| Loss on ignition | 4.34 | 5.00 |
| Totals | 100.52 | 100.13 |

The river clay is high enough in ferric iron to burn to a reddish color, but the terrace clay would probably become deep-red when subjected to heat. Although both clays are low in alumina they are quite plastic and free from grit, the included sand grains being of microscopic size.

## *Residual Clay.*

Residual clay, which is derived from weathered rocks and shales and still remains at its original location, is not of sufficient importance in Tucker to be classed as a building clay material, most of it having washed down the mountainsides to the river valleys below. Whatever of these deposits still remains in place should rather be considered as soil, more valuable for agricultural than for other purposes.

## *Stratified Shales.*

Stratified shales, composed principally of silica and alumina, with a variable content of ferric iron, occur abundantly in the Conemaugh Series of Tucker, but are less extensive in the Allegheny and Pottsville where the sediments contain more sandy material. In the Mauch Chunk Series, shale is found in great quantity. In the Greenbrier Series there are thin beds of red shale in the upper portion, which, being presumably largely derived from the lime, might contain too much calcareous matter to be used for brick or other earthenware. In the Pocono Series there is only a limited amount of shale and this is often too sandy to be of value.

The Catskill Series, in the main portion of its outcrop in the county, is mostly composed of red shale, of similar character to that of the Mauch Chunk. The Chemung Series contains a large amount of olive-green shale but it is so interlaminated with thin beds of sandstone that, in most localities, it becomes available only after it has been weathered and redeposited as river or terrace clay. The principal stratified shales available for brick or tile manufacture are therefore to be found in the Conemaugh, Mauch Chunk, and Catskill Series. These shales, as revealed in the measured sections of Chapter IV, and as further described in detail in Chapters V, VIII, and XI, constitute an inexhaustible supply of raw material, an abundance of which is available within easy reach of every town and village of the county, as shown by Map II. At many points they could be quarried at extremely low cost and coal is available in the county for burning the fabricated material. Nearly all of these shales will burn to a red color. As building brick or tile they are first-class in composition but as paving brick they are somewhat inferior to the product made from regular fire clay shales. If intended for local pavement, however, the use of material at hand is often justified by the lower cost and by the fact that the money spent remains in the community.

### *Fire Clay.*

The fire clay horizons of the county, exclusive of thin and often impure beds which occur under nearly all the coal seams, are found only in the Allegheny Series. In Chapter VI three beds of minable thickness, the Lower Freeport, Canaan Mountain, and Lower Kittanning, have been described. They are apparently somewhat local in their deposition but are chemically well suited for the manufacture of high-grade paving brick.

## BUILDING STONE.

### QUARRIES.

In Chapters V to VII the various sandstone quarries found in the county have been described in detail, and in the Index at the end of the volume they are classified under the heading of "Sandstone Quarries", making this matter easily available without further recapitulation.

## AVAILABLE STONE.

The sandstones of the county, as described in Part II of this Report, vary from flaggy and shaly beds that do not have the necessary cohesiveness to be used for building stone, to great massive ledges, 50 to 100 feet thick, that will split into any desired size. In the Conemaugh Series the ledges are usually micaceous, gray on fresh fracture, but often weathering to brown. In the Allegheny and Pottsville they are uniformly gray and highly siliceous, changing in color but little after long exposure, and often conglomeratic, the included matter consisting of white quartz pebbles. In the Pocono Series the sandstones are highly conglomeratic and of irregular cleavage. In the Mauch Chunk and Catskill, they are usually flaggy or shaly and in the Chemung they are composed of hard thin layers varying from a few inches to one foot in thickness, interlaminated with shale. Nearly all of the heavier-bedded strata of the county lack the beauty of texture and smoothness of grain to make them desirable for architectural purposes where ornamental or carved stone effects are desired. In all structures, however, where durability and fire-proof construction are the main features some of them can not be surpassed by any stone shipped in from other counties or States. They are fitted for bridge piers and abutments, retaining walls and for buildings of plain construction. In nearly every locality where the Conemaugh, Allegheny, and Pottsville outcrop, one or more of these ledges is of massive character and can be quarried, many of the outcrops having been described in detail in the chapters on Stratigraphy. On a following page, under the subject of "Road Material", will be found a table indicating the principal sandstone beds worthy of attention from a building standpoint, together with the necessary references to their detailed descriptions.

## ROAD MATERIAL.

### RIVER AND CREEK GRAVEL.

Attention has been called in many previous Reports of the Survey to the fact that most of the rivers and creeks of the State contain an abundant supply of gravel, which, being the more resistant portions of the rocks from which they came, afford good material for improving roads that is often cheaper than any other that can be secured. This is particularly true of the gravels which come from the Chemung Series, as the thin-bedded sandstones from which they are derived are extremely hard and compact, a large amount of gravel being annually dredged from Cheat River at Point Marion and Cheat Haven, Pennsylvania, near its mouth, and distributed to builders in the Monongahela Valley, and having its source chiefly from the Chemung Rocks of Tucker and Preston Counties. In the region of these outcrops in the county many of the roads follow closely the course of the streams, making it possible to macadamize with gravel at much less cost than with stone quarried from the hills.

### SAND.

Sand, which is another essential material needed in road building, both in masonry construction and in concrete, is found generally along the rivers and creeks of the county, being derived in great abundance from the coarse sandstones of the Allegheny and Pottsville Series, and being usually sharp and reasonably free from organic accumulations.

### BRICK MATERIAL.

As stated on page 444, under the heading of "Stratified Shales", there is an abundance of material that can be made into brick, some of it probably durable enough to answer local purposes for road pavement, provided a subgrade of concrete be built to carry some of the shock of traffic. A better material for road pavement is contained in the fire clays of limited extent which have been previously described.

## STONE FOR MASONRY, MACADAM, AND CONCRETE.

As stated on page 445, under the subject of "Building Stone", there are many sandstone ledges in the county that can be used for general masonry purposes, as well as for concrete aggregate. Sandstone is not ideal for macadam but certain of the more resistant ledges, such as the Homewood and Upper Connoquenessing of the Pottsville and the Princeton Conglomerate of the Mauch Chunk Series could profitably be used for local macadam, because of the low first cost. By far the best material in the county available for road macadam or road concrete is the Greenbrier Limestone, which outcrops widely as indicated on Map II, and can be quarried at low cost. As macadam it is ideal material both because of its durability and because of its cementing value. As a source of concrete it can be manufactured into cement and crushed into aggregate, leaving only the sand to be obtained from other sources.

The following table gives a list of the principal sandstones that would prove suitable for quarrying, together with references to the pages on which they have been described, those printed in full-faced type having already been used in masonry construction:

Table of Sandstones Available for Masonry Construction.

| Name of Sandstone. | Geological Series | Approximate Thickness Feet. | Page on which Described. |
|---|---|---|---|
| Upper Grafton | Conemaugh | 10 to 20 | 162 |
| Grafton | Conemaugh | 20 to 30 | 162–3 |
| Jane Lew | Conemaugh | 20 to 30 | 165–6 |
| Saltsburg | Conemaugh | 20 to 30 | 166 |
| Buffalo | Conemaugh | 20 to 30 | 170 |
| Upper Mahoning | Conemaugh | 20 to 35 | 172–3 |
| **Lower Mahoning** | Conemaugh | 20 to 35 | 175–6 |
| Upper Freeport | Allegheny | 20 to 30 | 183 |
| Lower Freeport | Allegheny | 20 to 30 | 185 |
| Kittanning | Allegheny | 10 to 20 | 193 |
| **Homewood** | Pottsville | 50 to 100 | 199–201 |
| Upper Connoquenessing | Pottsville | 75 to 100 | 204–5 |
| Lower Gilbert | Pottsville | 25 to 50 | 210–12 |
| Upper and Lower Nuttall | Pottsville | 50 to 75 | 214 |
| Upper and Lower Guyandot | Pottsville | 25 to 50 | 218 |
| Upper Raleigh (Sharon?) | Pottsville | 25 to 70 | 221 |
| Princeton Conglomerate | Mauch Chunk | 0 to 100 | 228 |

In addition to the sandstones listed in the above table some of the beds of the Pocono are of local value and in the Catskill there are ledges on Dry Fork of Cheat River between Richford and Jenningston that will furnish masonry stone of fair quality. In the Chemung Series the thin-bedded sandstones occasionally coalesce into more massive deposits and at such points would provide durable material.

# PART IV.

## Paleontology.

## CHAPTER XVII.

### MISSISSIPPIAN FAUNAS.

Through the courtesy of Dr. George Otis Smith, Director of the United States Geological Survey and Dr. George H. Girty, Geologist of the United States Geological Survey, we are enabled to publish a paper of very great scientific value on the paleontology of the Mississippian beds. Dr. Girty has had this paper in preparation for many years, and it represents a very large amount of hard work which he has given to the West Virginia Geological Survey as a "labor of love". Dr. William Armstrong Price, who, before his resignation from our Survey staff, accompanied Dr. Girty into West Virginia and assisted is making some collections of fossils, had expected to join Dr. Girty in the preparation of this Mississippian paper, but the exigencies of business engagements prevented this. It is possible, however, that Dr. Price may later find time to complete a short paper he had begun on the history of the Mississippian terminology, etc. Dr. Girty's paper follows herewith, (I. C. W.):

# OBSERVATIONS ON THE FAUNAS OF THE GREENBRIER LIMESTONE AND ADJACENT ROCKS.

By
George H. Girty[1]

Although the present report was designed as a contribution to the paleontology of Tucker County, none of the collections with which it is concerned actually came from Tucker, and only 8 were made expressly for it. These last were obtained by Doctor Price and myself in September, 1920, and the place selected, Mill Point, in Pocahontas County, was chosen for the following reasons. As nearly as can now be determined Mill Point is the typical locality for the Greenbrier Limestone, a formation name which is one of the oldest and most widely current of any applied to Mississippian rocks in the Appalachian region, but which, like many of these names, has remained largely without paleontologic implication up to the present time—at least so far as authentic or typical sections are concerned. As it was intended to use Greenbrier Limestone in the report on Tucker County, and as Mill Point was so near by that the formation would probably not vary much either lithologically or paleontologically from one area to the other, an opportunity seemed open to contribute something to geologic nomenclature and to the paleontology of Tucker County at the same time.

From what has just been said the rocks included under the formation name Greenbrier Limestone and the faunas which they contain form the chief subject of the present paper. For this reason it will be readily understood why the collections from Mill Point, where the formation proved to be rather meagerly fossiliferous, have been supplemented by those obtained in other areas where the Greenbrier has been identified. These supplementary collections were made at various times and by various people, by Mr. White, Mr. Harns-

[1]Printed by permission of the Director of the United States Geological Survey.

berger, Mr. Stose, myself, and others, mostly in connection with areal mapping for folios of the United States Geological Survey. Because the faunas from the rocks in this region called Mauch Chunk Shale by the West Virginia Survey were of less immediate interest, and because the time at my command was limited, I have discussed only the collections made at Mill Point, without touching upon the Mauch Chunk or correlated faunas from other areas.

It is more agreeable to convention, and in many ways more satisfactory, to consider a series of faunas from below up, but here, for the sake of continuity, because I propose to leave the Mauch Chunk faunas with the Mill Point region and carry the Greenbrier faunas on to other areas, it seemed best to follow the opposite course and cite the faunas in descending order.

According to Roger's section the beds referred under the Mauch Chunk measure 1,260 feet in thickness, but only about 350 feet near the base of the formation were examined by Dr. Price and me. Three fossiliferous horizons were found in this part of the section, and from these collections were made as follows. From a thin limestone 157 feet above the top of the Greenbrier (lot 3287)[2]:

Fistulipora excellens var. Harrisonensis
Stenopora sp.
Fenestella tenax
Fenestella serratula
Archimedes Meekanus
Rhombopora sp.
Streblotrypa subspinosa
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Spirifer Leidyi
Spirifer increbescens
Spiriferina spinosa
Composita subquadrata
Leda aff. nasuta
Parallelodon sp.
Schizodus depressus var. abruptus
Aviculipecten aff. Tahlequahensis
Deltopecten aff. Ozarkensis
Orthoceras aff. epigrus

[2]For description of this and other localities designated by number see list at end of this paper (pp. 447-447).

Another calcareous horizon about 100 feet above the top of the Greenbrier gave the following species (lot 3294):

Triplophyllum sp.
Fenestella serratula
Orthotetes n. sp. ?
Productus ovatus
Diaphragmus elegans
Dielasma Arkansanum
Spirifer Breckenridgensis
Spirifer Leidyi
Spirifer increbescens
Spiriferina spinosa
Martinia sulcata
Composita subquadrata
Sphenotus ? sp.
Aviculipecten inspeciosus
Myalina Sanctiludovici ?

In this fauna one may note the differentiation of the Spirifers among which it is practicable to distinguish three types, as above recorded, and also the abundance of Martinias. Martinia is not confined to the Mauch Chunk, but at some points, as at this one, it appears with striking profusion in the lower part of the formation.

From 7 feet of limestone and shale about 85 feet above the top of the Greenbrier we collected the following (lot 3286):

Pentremites aff. Girtyi
Stenopora sp.
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Spirifer increbescens
Spirifer Leidyi ?
Composita subquadrata ?
Cliothyridina sublamellosa
Eumetria Verneuiliana
Sphenotus ? sp.
Aviculipecten inspeciosus
Aviculipecten aff. Mayesensis
Leptodesma ? sp.
Sulcatipinna Missouriensis
Bellerophon aff. sublevis
Platyceras aff. subrotundum
Griffithides sp.

This fauna requires no comment. Pentremites were fairly abundant but the specimens collected were more or less fragmentary. They show a large form (if there is but one) having an elongate shape and deeply concave ambulacral areas.

The Greenbrier proved to be sparingly fossiliferous in this region. A coral here and there (probably belonging to the genus *Triplophyllum*) was all that a careful search disclosed, except near the top where fossils became more plentiful. About 50 feet below the top of the Greenbrier the following fauna was collected (lot 3284):

Cystelasma ? sp.
Pentremites aff. Okawensis
Fistulipora excellens var. Harrisonensis ?
Fenestella tenax
Polypora ? aff. corticosa
Polypora ? sp.
Lingulidiscina sp.
Crania Chesterensis ?
Orthotetes Kaskaskiensis var.
Productus ovatus
Dielasma Arkansanum
Camarophoria explanata
Spirifer Leidyi ?
Spiriferina spinosa ?
Spiriferina transversa
Composita subquadrata ?
Cliothyridina sublamellosa
Eumetria Verneuiliana
Nucula Illinoisensis ?
Conocardium Chesterense ?
Leptodesma Spergenense ?
Pleurotomaria sp.
Pleurotomaria aff. Bonharborensis
Naticopsis (Naticella ?) n. sp.
Bulimorpha aff. bulimiformis
Sphaerodoma ? sp
Orthoceras aff. epigrus

The single *Pentremite* listed above is apparently a young specimen and the identification suggested may be remote from its true relations.

About 25 feet lower in the section, or 75 feet below the top of Greenbrier, we collected the following (lot 3285):

Triplophyllum sp.
Pentremites Godoni
Stenopora aff. Cestriensis
Fenestella serratula
Fenestella multispinosa ?
Chonetes sericeus ?
Productus ovatus

Pustula aff. Indianensis
Diaphragmus elegans
Camarophoria explanata
Dielasma Arkansanum
Spirifer sp.
Spiriferina subspinosa
Reticularia setigera
Composita subquadrata
Cliothyridina sublamellosa
Eumetria Verneuiliana
Cypricardella ? aff. oblonga
Euomphalus planidorsatus
Naticopsis (Naticella ?) n. sp.

I am here following Professor Weller's interpretation of *Pentremites Godoni* as a species having flat, instead of strongly concave, ambulacral areas. The collection contains 3 specimens of which one is evidently immature and consequently may be left out of consideration. The better of the two mature specimens is not typical in that it is uncommonly short and broad, having the sides much contracted towards the apex, so that the outline in side view is conspicuously triangular. The other specimen appears to have a more normal configuration, but some of its characters are not well shown.

As our Greenbrier faunas come from near the top of the formation (except those considered later on) and as our Mauch Chunk faunas come near the base of the rocks assigned to that formation, all occur within rather narrow stratigraphic limits, and do not in fact show very striking differences. The differences which might be expected between the faunas of a formation preeminently calcareous and a formation preeminently shaly and which do in fact exist in a broad way between the Greenbrier and the Mauch Chunk (or the contemporaneous Pennington) are by no means striking. I refer of course to the tendency of the brachiopod element to prevail in faunas obtained from limestone formations and of true mollusks (especially pelecypods and gastropods) to prevail in faunas obtained from shale formations. As listed above the Mauch Chunk faunas contain as many brachiopods, in species, as the Greenbrier faunas, and the Greenbrier faunas nearly as many mollusks as the Mauch Chunk faunas. There is, it is true, not a little difference between the mollusks of the one formation and those of the other, but whether this difference is persistent and distinctive or is due merely to incomplete collections from a richly varied mulluscan fauna, the present evidence is too limited to show. I suspect that there exists a real difference in the molluscan representation, but not of the degree nor yet of the character that these lists suggest.

The brachiopod representation of the two faunas is, of course, very nearly the same. Certain differences are obvious, some of which appear to be significant, while others probably are not. The presence of *Camarophoria explanata* in both Greenbrier collections and its absence from all three Mauch Chunk collections would appear to be noteworthy and also the abundance of Martinia in one of the Mauch Chunk collections and its absence from the Greenbrier collections.

As has already been remarked, the main body of Greenbrier is surprisingly poor in fossil remains—at least in this region. Except for the two collections obtained within 75 feet of the top the only other fossils collected came from within 70 feet of the base of the formation, leaving between the fossiliferous upper part and the fossiliferous lower part an interval of about 800 feet unrepresented in our collections. At one locality in the lower part of the Greenbrier (within 70 feet of the base so far as we could determine, though at the locality we could determine only that the horizon was not far above the base) we collected the following species (lot 3282a):

Anisotrypa n. sp. aff. solida
Chonetes sericeus
Orthotetes Kaskaskiensis var.
Avonia Arkansana var. multilirata ?
Productus inflatus
Productus ovatus
Diaphragmus elegans
Camarotoechia Purduei ?
Spirifer Leidyi ?
Composita subquadrata
Cliothyridina sublamellosa

This collection represents a single locality and horizon; the following represents a single locality but several horizons, ranging perhaps through 70 feet of the basal part of the Greenbrier, the lower limit of which is here closely determinable (lot 3283):

Lithostrotion basaltiforme
Fenestella tenax

Polypora aff. nodicarinata
Dichotrypa expatiata ?
Rhombopora sp.
Orthotetes Kaskaskiensis
Productus ovatus
Productus inflatus var.
Productus parvus ?
Pustula biseriata ?
Camarotoechia Purduei ?
Spirifer Leidyi
Composita subquadrata
Cliothyridina sublamellosa

The following collection was made at a number of points all within a square mile of territory and at a number of horizons all in the lower part of the Greenbrier and mostly within 50 feet of its base (lot 3282):

Virgula ? n. sp.
Endothyra n. sp.
Lithostrotion basaltiforme
Triplophyllum Pellense
Campophyllum n. sp.
Monilipora n. sp.
Stenopora sp.
Productus inflatus
Productus sp.
Bellerophon scissile

All three of the collections from the basal part of the Greenbrier have much in common and much, moreover, that is unusual, though they show individual characters which can readily be seen by comparing the lists with one another.

These faunas are in marked contrast to the faunas of the upper part of the Greenbrier, and not only so, but they indicate a different geologic age, for while the upper faunas are obviously Chester, these lower ones are doubtfully so. It seems opportune for me to say that in the following discussion the Ste. Genevieve Limestone is not regarded as forming part of the Chester group and the term Chester is employed in a sense that excludes the Ste. Genevieve.

These three faunas differ from one another more or less, and they differ greatly from the higher faunas in the Greenbrier; how greatly can readily be seen by comparison of the faunal lists. In their relation to one another lots 3282 and 3283 stand together, while lot 3282a has little that is really significant in common with the two others. The mode of preservation also is different, the specimens forming lot 3282a being inclosed in a calcareous matrix but those of the two other collections being silicified and occurring free. It is possible, therefore, that lot 3282a represents a higher horizon and is of a younger geologic age, although we did not think so when the collection was made.

The sponge cited as *Virgula (?)* n. sp. (found only in lot 3282) is abundant, and its organic nature might easily be overlooked. It occurs as subcylindrical stems rarely more than one inch in diameter and broken into segments, few of which are as long as 3 inches. Some of the pieces are curved, but none shows any evidence of branching. At first glance they appear to be merely ropy pieces of chert, but many of them, if examined with a glass, show spicular structure very clearly.

Large compound corals of the type commonly identified as *Lithostrotion basaltiforme* are also common (represented in lots 3282 and 3283, but not in 3282a). It has been the practice to refer all the massive *Lithostrotions* or those which have polygonal corallites in contact with one another, to a single species *(L. basaltiforme)*, and all the bushy forms that have cylindrical corallites separated from one another, to another species *( L. proliferum)*. It is in this loose way that the name *L. basaltiforme* is used in this place. The mode of growth is, of course, an important character in these corals, but it can not be safely used without regard to their internal sturctures and it is probable that each of the "species" when carefully studied will be found to constitute not a single species but a group.

Attention may also be called to *Campophyllum* n. sp., *Chonetes sericeus* and *Camarotoechia Purduei*, types that are more or less alien to the upper Mississippian faunas of the typical sections. *Diaphragmus elegans* can be definitely identified in one of the collections (3282a). *Productus inflatus*, which has a certain stratigraphic significance, is fairly abundant at the same locality as the foregoing, and the identification is fairly close, though some characters are not well enough shown for comparison with typical specimens.

Having now determined, at least in some measure, what the typical Greenbrier faunas are like, we may advantageously digress to others that may be equally typical in their proper characters, but do not derive from the typical section. As one of the principal objects of the present study is to show the characters of the Greenbrier faunas of Tucker County, probable if not actual, a few collections from the Buckhannon quadrangle may next be considered. The Buckhannon lies directly north of the Huntersville quadrangle, in which Mill Point is situated, and to the northeast of it is Tucker County not very far away.

Three collections may be cited as germane to this investigation, but their stratigraphic position in the Greenbrier can not be given. The faunas are, however, closely similar to one another and to the upper faunas of the Greenbrier obtained at Mill Point, so that they may be safely inferred as representing at least not the basal Greenbrier. One collection furnished the following species (lot 695):

Triplophyllum sp.
Fistulipora sp.
Orthotetes Kaskaskiensis
Girtyella turgida
Girtyella Indianensis
Spirifer Leidyi
Martinia sulcata ?
Composita trinuclea
Composita levis
Cliothyridina sublamellosa
Cliothyridina sp.
Eumetria Verneuiliana
Allerisma clavatum
Deltopecten sp.
Platyceras sp.

Another presents almost the same faunal facies, namely (lot 696).

Triplophyllum Pellense
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Girtyella brevilobata
Spirifer Leidyi
Composita trinuclea ?
Composita levis
Cliothyridina sublamellosa
Platyceras sp.
Griffithides sp.

The other is rather more different (lot 730a).

Lithoclione sp.
Triplophyllum sp.
Stenopora Cestriensis
Fenestella tenax
Rhombopora ? sp.
Streblotrypa aff. distincta
Crania Chesterensis
Orthotetes Kaskaskiensis
Productus aff. setiger
Pustula aff. punctata
Diaphragmus elegans
Girtyella n. sp.
Spirifer Leidyi
Spirifer increbescens
Spiriferina spinosa
Martinia sulcata ?
Composita subquadrata
Cliothyridina sublamellosa
Eumetria Verneuiliana
Aviculipecten sp.
Sulcatipinna aff. Maxvillensis
Euomphalus planidorsatus
Cycloceras sp.
Griffithides sp.
Bollia sp.
Primitia sp.
Paraparchites sp.

Few comments are suggested by a comparison of the Greenbrier collections from the Buckhannon quadrangle with those from the Huntersville quadrangle, the comparison, of course, being made with the upper fanuas of the latter. The one group follows the other very closely and the significance of such differences as can be traced it is impossible now to interpret. The *Pentremites* which appear to be especially a development of the more southern faunas and are represented in the collections from Mill Point do not appear in those from the Buckhannon quadrangle. The terebratuloids represented by the genus *Dielasma* in the collections from the Huntersville quadrangle are replaced by *Girtyella* in the collections from the Buckhannon quadrangle. The representative of that genus found in Lot 730a in uncommonly short and broad, and apparently belongs to an undescribed species. *Camarophoria explanata,* found in both of the Huntersville collections, is lacking in all three of those from the Buckhannon quadrangle. *Martinia sulcata ?* which is one of the rarer forms in the Buckhannon collections, though identified in two of them, is absent from both the collections from the upper Greenbrier of the Huntersville quadrangle. The genus *Composita* seems to be represented especially by *C. trinuclea* and *C. levis* in the Buckhannon collections, and by *C. subquadrata* in the Huntersvilla collections. One of the peculiarities of Lot 730a when compared with the two other lots from the Buckhannon quadrangle has already been mentioned, the presence of a new species of *Girtyella*. In addition to these the two Producti (cited as *P. aff. setiger* and *Pustala aff. punctata*) are perhaps the most important, although each of the species is represented by a single poor specimen.

A collection geographically nearer to Tucker County than any of the others is one from the Piedmont quadrangle. Indeed, the Piedmont quadrangle overlaps onto Tucker County in its southwest corner, and the fossil locality is situated not far from the county line, lying to the north, whereas the Buckhannon localities lie to the south and west, of the area forming the subject of this report. The fauna contained in this collection is almost identical with that contained in the collections from the Buckhannon quadrangle just set forth. It is as follows (lot 701):

Agassizocrinus n. sp.
Stenopora sp.
Fenestella tenax
Fenestella sp.
Rhombopora sp.
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Girtyella brevilobata
Spirifer Leidyi
Martinia sulcata
Composita subquadrata
Composita trinuclea
Cliothyridina sublamellosa ?
Aviculipecten sp.

These lists exhaust the data that are available for the region near Tucker County to the north and east of the typical section of the Greenbrier Limestone in the Huntersville quadrangle. I shall next consider some collections from the Greenbrier to the south and west of the typical section.

From the Hinton quadrangle, which corners with the Huntersville to the southwest, I have no collections, and the Greenbrier does not come to the surface in the Raleigh quadrangle, which lies directly west of the Hinton. Directly south of the Raleigh, however, lies the Pocahontas, and from that quadrangle I have material. The collections which are to be considered are two in number. They are essentially composite, one (lot 3221) coming from cuts and outcrops along the wagon road and trolley line from two to two and a half miles northeast of Bluefield, the other (lot 628) coming from cuts along the railroad from Bluefield to two and a half miles northeast of the station, especially in cuts occurring in the last mile or so. Before considering the faunal characters of these collections, both of which are interesting and one so remarkable as to warrant especial discussion, it will be desirable to glance at their stratigraphic relations.

In this region the Greenbrier is mapped as a narrow band crossing the sheet obliquely in a narrow straight line from northeast to southwest. To the north the geologic sequence is normal, the Greenbrier being followed by the Bluefield (Mauch Chunk) Shale and so on. To the south the Greenbrier is shown to be faulted against the Kimberling Shale, a much older formation. The rocks dip steeply to the southeast, but are overturned so that in passing to the northwest one appears, from the dip, to be going down in the section, whereas he is actually going up. The railroad, the wagon road, and the trolley line follow more or less closely the strike of the rocks for several miles to the northeast of Bluefield, but as the road and trolley line are situated a little to the north and west of the railroad the collection 3221 is generally a little higher in the section than the collection 628.

I find it difficult to harmonize my observations exactly with the mapping in the vicinity of Bluefield. On the map the line of the railroad for some distance on both sides of Bluefield practically coincides with the boundary between the Greenbrier Limestone and the overlying Bluefield (Mauch Chunk) Shale, so that my collection from the railroad cuts ought to occur stratigraphically at the top of the Greenbrier, if not in the higher formation, and my collection from the wagon road and trolley line ought to be in the Bluefield (Mauch Chunk) Shale. The main body of the limestone, however, lies to the northwest of the railroad, and beyond the limestone in the same direction occur shales, thin limestones, and sandstones that must represent the Bluefield (Mauch Chunk) formation. There can be little real doubt, however, that my collections represent the beds mapped in this area as Greenbrier Limestone.

Furthermore it is stated in the folio that only the upper part of the Greenbrier Limestone is present in the outcrops along East River Valley. Nevertheless in the Abingdon quadrangle, which corners with the Pocahontas to the southwest, the Newman Limestone, which would appear to be the Greenbrier under another name, contains the same fauna as one of these collections (lot 628), but near its lower instead of near its upper boundary.

As to the stratigraphic relations to one another of the two collections here considered, there can be no question that the one cited as 3221 represents a somewhat higher horizon than 628 at least in the main, probably by several hundred feet, but as the material contained in both collections was picked up from point to point and undoubtedly at varying horizons exact statements can not be made. Mr. Campbell was probably justified in calling this formation abundantly fossiliferous, yet the outcrops in this region are such that fossils are difficult to collect. Great numbers of them may be seen at a place, but only a few practicable for collecting and perfect enough to have scientific value. Furthermore, it is difficult to link together the different horizons stratigraphically, because the character of the rock is ever changing at the same horizon, so as to make a nice tracing of individual beds not an easy task. The two faunas that I have obtained under these conditions show striking differences. These differences, however, have been exaggerated somewhat by the circumstances under which they were collected. I am under the impression that I saw, but was unable to collect, a number of forms at or near the horizon where the bulk of each collection was made that would bring the two lists into closer agreement than they now show. From the upper horizon I collected the following (lot 3221):

Pentremites Godoni
Pentremites Godoni n. var.
Talarocrinus innatus
Pterotocrinus serratus
Fistulipora excellens?
Stenopora sp.
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Spirifer Leidyi?

The collection from the lower horizon contains the following species (lot 628):

Triplophyllum Pellense
Pentremites pulchellus
Pentremites aff. pyriformis
Platycrinus Huntsvillae
Fistulipora excellens var. Harrisonensis ?
Stenopora emaciata
Fenestella tenax
Fenestella sp.
Polypora aff. Cestriensis
Pinnatopora sp.
Lingulidiscina aff. Newberryi
Rhipidomella aff. Nevadensis
Schizophoria aff. Swallowi
Chonetes Oklahomensis
Productus inflatus
Productus inflatus var.
Productus parvus ?
Pustula Genevievensis ?
Diaphragmus elegans
Camarotoechia n. sp.
Girtyella brevilobata
Girtyella turgida ?
Spirifer aff. Washingtonensis
Spirifer increbescens
Reticularia setigera
Martinia contracta ?
Spiriferina subspinosa
Composita trinuclea
Cliothyridina sublamellosa
Eumetria vera
Parallelodon sp.
Platyceras sp.

The identification of *Pentremites pulchellus* rests on a number of fairly good specimens and is reasonably dependable, the species being rather unusually characterized. Stratigraphically *P. pulchellus* is restricted to the Fredonia oolite and to the Shetlerville formation of Weller of the Mississippian section as it is developed in western Kentucky and southern Illinois. *Platycrinus Huntsvillae,* or as Professor Weller probably more correctly cites it, *P. penicillus,* is identified on a single specimen, but unlike many citations of the species, whose warrant consists only of the oblong serrated stem segments, this identification is based upon a dorsal cup, not quite perfect, it is true, but showing all the characters of the species. Professor Weller seems to have sought in vain for specimens of *P. Huntsvillae* outside of the Ste. Genevieve Limestone, so that these two forms taken together would seem to weigh heavily for the Ste. Genevieve age of this fauna. As against this conclusion, however, stands *Diaphragmus elegans,* which is abundant in this collection and which is rarely found at all in the Ste. Genevieve, and still more rarely found in abundance. In this connection, however, it should be stated that by one of those curious turns of chance with which everyone is familiar, practically all of my numerous specimens are ventral valves, and although they seem to have all the characters of ventral valves belonging to *D. elegans,* I never consider the identification of that species as wholly beyond question without dorsal valves. In this case I have one dorsal valve which, although not very perfect, seems to show the characters of *D. elegans,* and thus to establish the identification. Tending in the same direction is *Spiriferina subspinosa* (which, though resting for its identification on a single specimen, is cited with considerable confidence), for Professor Weller found *S. subspinosa* restricted to his Shetlerville formation. Thus some of the forms tend to indicate the Ste. Genevieve alone—others Weller's Shetlerville alone—and others the same formations in an alternative relation. *Martinia contracta* might also be mentioned, though its presence here could hardly be in accord with a correlation with the Ste. Genevieve.

Some features of this fauna are interesting in themselves apart from any evidence in correlation. This is especially true of *Rhipidomella* aff. *Nevadensis* and *Schizophoria* aff. *Swallowi.* Except for a small *Rhipidomella* of the *dubia* group which is fairly common in the Ste. Genevieve Limestone, Orthoids are unknown in the upper Mississippian of the typical area. Consequently to find in beds that are undoubtedly of upper Mississippian age, two species that closely simulate the two Burlington species *S. Swallowi* and *R. Burlingtonensis* (or perhaps better *R. Nevadensis*) is at least surprising. The Schizophoria, moveover, is exceedingly abundant, though the Rhipidomella is rare. In somewhat similar case is the form cited as *Chonetes Oklahomensis.* This form is by no means abundant, but Chonetes, like Rhipidomella and Schizophoria, is almost unknown in the typical faunas of the upper Mississippian. It is true Professor Weller has found a Chonetes (which he identifies as *C. cf. Chesterensis*) in the Paint Creek fauna of which he regards it as a significant feature. Finely striated species of Chonetes are difficult to distinguish and identify except upon the very best material, and probably the form found in the Greenbrier Limestone has more significance in its generic than in its specific character. If it bears any evidence at all as to geologic age, it suggests a horizon not of the Ste. Genevieve, but younger.

Perhaps instead of signifying something in correlation or in geologic age, the real significance of this form *(C. Oklahomensis)* in the Greenbrier is that we are dealing with faunas in a more or less distinct faunal province from the typical Chester, for Chonetes is abundant in the Chester faunas of Oklahoma and Arkansas and is one of many features that distinguish those faunas from the typical Chester ones. A further suggestion along the same line is found in the large Rhynchonelloid cited as *Camarotoechia* n. sp. These fossils are rare at this locality and those in my collection also are rather badly preserved, so that the citation may cover more than a single species, but the form is evidently related to *Camarotoechia Purduei* and its varieties. Large (or at least not small) Camarotoechias are abundant in the Chester faunas of Arkansas and Oklahoma—especially the earlier ones, wherein again those faunas are distinguished from the typical faunas of the Chester, in which, above the Ste. Genevieve (which contains *Pugnoides Ottumwa,* but which is not here considered as Chester) Rhynchonelloids are exceedingly scarce, consisting possibly of a rare Rhynchopora or of abundant

*Camarophoria explanata,* though of course the latter species is strictly not a Rhynchonelloid, but a Pentameroid. Some of the lists that I shall present later on show faunas having quite as novel and striking facies as this, faunas which are widely dissimilar to any of the typical Chester faunas, and are consequently very difficult to interpret. They emphasize the fact that we are dealing with a distinct faunal province in the Appalachian region, one having in a considerable measure its own faunal assemblages and sequences, and exhibiting many new types as well as many old types in new combinations.

The fossil cited as *Spirifer* aff. *Washingtonensis* is also deserving of mention. The form itself, although the name suggests even the *Productus magnus* fauna which Professor Weller regards as Warsaw, is only a variety of *S. increbescens* which is rather finely costote and considerably extended transversely, so that the shape carries with it suggestions of *S. Washingtonensis,* though the costae are finer than those of the more typical varieties of that species.

Just west of the Pocahontas quadrangle lies the Tazewell, which, like so many of the earlier units, has been divided into four 15-minutes quadrangles. From the Pounding Mill quadrangle, which comprises the southeastern quarter of the original Tazewell quadrangle, several collections deserve mention. One of these represents the upper part of the Greenbrier (by which is here meant any horizon above the basal part) with the following fauna (lot 2015):

Penetremites aff. florealis
Triplophyllum spinulosum
Fenestella sp.
Productus ovatus
Diaphragmus elegans
Camarophoria explanata
Spirifer aff. Pellensis
Martinia contracta
Composita subquadrata
Bellerophon sp.
Griffithides sp.

The citation of *Pentremites aff. florealis* is based upon a single specimen, which is very small and probably immature. It resembles some of the small specimens referred to that species under figures in Professional Paper 36. The other forms need no comment.

Of much greater interest are some collections from the basal part of the Greenbrier, one group from near Cedar Bluff, the other from near Shrader, both localities being situated in Virginia, just south of the West Virginia boundary. The original collection from near Cedar Bluff was made by Mr. Harnsberger, but I revisited the locality, without, however, adding much to the fauna originally collected. At this locality (Station 2013) an interval of about 50 feet occurs between the highest exposure of the Kimberling and the lowest exposure of the Greenbrier. It it possible that this interval represents the "Pulaski Shale", which though it has not been mapped as occurring in the Tazewell quadrangle, appears to be present farther south in the Abingdon quadrangle, where Mr. Stose has named it the Maccrady formation, because the name "Pulaski" is preoccupied by a formation of Ordovician age. The base of the Greenbrier as it is exposed at this locality consists of about 40 feet or less of calcareous shale, or stiff, earthy and shaly limestone, scantily fossiliferous. Above this follow 5 feet of siliceous limestone, nearly black, containing many chert nodules as well as silicified coral, Lithostrotion, and Syringopora. Then come about 15 feet of light-colored shaly limestone and calcareous shale, in which fossils are abundant and well preserved. The Syringopora found in the lower fossiliferous beds appears to be related to *S. Monroensis* of the Spergen Limestone, but has much more slender corallites. According to my notes, both forms of Lithostrotion were observed in this bed, the massive form *(L. basaltiforme)* as well as the bushy form *(L. proliferum)*, and one of the specimens collected apparently is of the latter sort, having corallites that are cylindrical and not in contact. The massive form, however, tends to have an irregular growth, some colonies having parts in which the corallites project away from the rest and are cylindrical, while in other parts the corallites are pressed together and are prismatic. Probably unless one could examine the entire colony he would not be justified in definitely identifying *L. proliferum* among these corals. As elsewhere mentioned, these two specific names are in this paper loosely used, implying a difference in mode of growth, without regard to internal structures. The following list shows the species collected at Station 2013, all of which practically come from the shaly beds overlying the black limestone with Lithostrotion;

Triplophyllum sp.
Michelinia Meekana
Spirorbis imbricata (?)
Stenopora n. sp. aff. ramosa
Stenopora aff. Cestriensis
Fistulipora aff. Spergenensis
Fenestella tenax
Fenestella sp.
Polypora aff. tuberculata
Rhombopora aff. tabulata
Cystodictya lineata
Dichotrypa aff. expatiata
Orthotetes Kaskaskiensis
Chonetes Oklahomensis (?)
Productus Keokuk (?)
Productus ovatus
Productus inflatus
Productus aff. scitulus
Camarotoechia n. sp. aff. Sappho
Dielasma sinuatum (?)
Spirifer Pellensis
Spirifer bifurcatus
Composita trinuclea
Cliothyridina sublamellosa
Plagioglypta Illinoisensis (?)
Pleurotomaria sp.
Bellerophon sublevis
Naticopsis Carleyana?

Several features of this fauna are rather striking but are not to be brought out in a mere faunal list. *Michelinia Meekana,* a form composed of large corallites and growing in more or less spherical or elongated masses, is quite abundant. Abundant also are bryozoa, especially bryozoa belonging to the genera Fistulipora and Stenopora, or, as I should probably call the genus, Tabulipora. The Fistulipora has, as usual, an incrusting habit and is marked by low but distinct monticules. Of the *Stenoporas,* one type, which is abundant, occurs as rather slender, solid branches *(S. aff. ramosa).* Another form, also ramose and also abundant, is distinguished among other things by having a much smaller diameter, commonly less than 4 millimeters. Another common type grows in the form of extended lamellae. The growth appears to have been primarily incrusting, but it appears also to have expanded beyond the object of support and by piling up layer upon layer to have built up large irregular masses 6 inches or more in diameter. Two species or varieties can tentatively be discriminated among these specimens, one having a mode of growth especially incrusting and distinguished structurally by having few, small, and inconspicuous acanthopores, the other by having stronger and more numerous acanthopores, and, though partly incrusting, by forming short (?) irregular hollow cylinders.

Of the brachiopods, mention must be made of a large, highly convex, finely striated *Chonetes* of the *Illinoisensis* type *(C. Oklahomensis)*, which is noteworthy, not only because it is abundant but because it represents a genus which is as a rule very rare in the middle and upper Mississippian. The kindred genus, Productus, which is commonly so abundant, is here conspicuously rare. The collection contains a single specimen which belongs to *P. inflatus,* or a species closely allied to it, and 8 or 10 specimens of a large, coarsely ribbed, nodose and spinose form that seems to be identical with *P. viminalis* as Profesor Weller calls it, although I believe that it would more correctly be called *P. Keokuk* Hall. Remarkable also is a large and abundant rhynchonelloid here cited as *Camarotoechia aff. Sappho.* The generic reference seems fairly secure, and the species is undoubtedly new. I have referred all my specimens to a single species, although they are highly variable, ranging in size from large (25 millimeters in length or more) to rather small, and in configuration from shells having relatively few large ribs to those having much more numerous small ones. In both types 4 plications commonly (more rarely 3 or 5) occur on the fold. Some of the specimens are crushed, others have been dissected into separate segments in the process of being turned into small geodes, so that it is especially difficult, in a group in which specific discrimination is always difficult, to determine how many species should actually be discriminated and how completely they intergrade. Some of the smaller shells may well be compared with the less numerous, apparently less differentiated, and generally smaller ones found in the lower Greenbrier near Mill Point (Station 3282a).

The other locality mentioned above is one near Shrader (Station 2020a) and here also the original collection was made by Mr. Harnsberger and a later one by myself. In this instance, as in the other, the horizon involved is one low down in the Greenbrier, but the fauna is in some respects conspicuously different. At this locality the Kimberling Shale is exposed in the creek bed, and the bulk of my collection comes from some outcrops along the road near by not more than 25 feet stratigraphically above the base of the Greenbrier. From exposures in the bed of the creek representing the Greenbrier itself and consequently close to the base of the formation I collected *Orthotetes Kaskaskiensis, Productus ovatus,* and *Spiriferina aff. Salemensis.* At the forks of the road, about 25 feet above the top of the Kimberling, I made the following collection (lot 2020a):

Syringopora n. sp.
Lithostrotion basaltiforme
Stenopora sp.
Rhombopora aff. tabulata
Dichotrypa aff. expatiata
Orthotetes Kaskaskiensis
Productus ovatus
Productus Altonensis (?)
Diaphragmus (?) n. sp.
Spirifer Pellensis
Spiriferina aff. Salemensis
Cliothyridina sublamellosa (?)

A little farther along the road and at a somewhat higher horizon I found *Schuchertella costatula (?), Productus sp.,* and *Spiriferina transversa* (?).

The smaller faunas may be disregarded and attention centered entirely on the larger one listed as 2020a. This fauna really stands in close relationship to the one collected near Cedar Bluff (2013), although it lacks some of the striking things and although it is likely to make a quite different impression on the collector, inasmuch as many of the forms common at Cedar Bluff do not occur at Shrader and as the specimens instead of occurring in abundance and in a free condition are rare and imbedded in a matrix.

Compound corals of the *Lithostrotion* group are fairly abundant. Many of them show an irregular growth, compact with polygonal corallites in part of the corallum, and spreading with rounded corallites in other parts. Whether any of the forms that occur there are entirely bushy I am unable to say. A rather small *Productus* is fairly common in the collection. It appears to have the *Diaphragmus* characters in an elementary stage of development, but the facts are not so clear that I can identify the genus as *Diaphragmus* without reserve. The species, however, is clearly not the common *D. elegans*. On the other hand the form cited as *Productus Altonensis* (?), which is represented by but a few specimens, may be only a finely ribbed variety of the foregoing which shows much variation in this character. One of the specimens especially shows a striking resemblance to *P. Altonensis*. The *Spiriferina*, which is a rather large form, appears to be ornamented neither with the short hollow spines of *S. spinosa* nor the regular, closely arranged lamellae of *S. transversa*. The form obtained along the road at a somewhat higher horizon is clearly of the *transversa* type, but it is less extended at the wings and has fewer costae on the sides.

From the Newman Limestone of the Abingdon quadrangle there are available numerous collections; too numerous to be considered here except in the form of a composite list. The composite list, especially if it involves a large number of collections differing from one another considerably in facies, in geologic horizon, and in geographic location, involves disadvantages almost too great to be acceptable for the present purpose, and another method of presenting the facts seems preferable, even if it does not present them so fully.

The Newman fauna viewed through my collections is noteworthy in several respects, in none perhaps more conspicuously than in the almost total absence of forms that abound in most Chester faunas and are more or less characteristic of the Chester. *Pentremites* are all but absent, and the spiral stems of *Archimedes* are wholly so. Perhaps even more significant is the absence of *Diaphragmus elegans*, so universally present in Chester faunas. The species has been definitely identified in only one collection, though it may be represented in a few others by indeterminable fragments. These facts can not be without significance, if taken in connection with the fact that the bulk of my material is known to repsent the lower part of the formation.

The statement has previously been made in this paper that a peculiar fauna which occurs in the upper part of the Greenbrier Limestone near Bluefield occurs in the lower part of the Newman Limestone in the Abingdon quadrangle. The following list shows the fauna to which this statement refers. The list is compiled from four collections, which, however, contain so nearly the same fauna that the disadvantages ordinarily inherent in composite lists are thought to be reduced to a minimum. The faunas are almost identical, and the geologic horizon also is almost the same.

The resemblance between this fauna from the Abingdon quadrangle and that from the Pocahontas quadrangle may be overstated, and without doubt must appear to be overstated to anyone who merely compares the two faunal lists. The abundance of certain forms, such as *Pustula Genevievensis (?)* and *Productus inflatus,* together with the lithologic similarity, which is so close that specimens are actually indistinguishable in their lithologic characters and mode of occurrence, impresses one perhaps more strongly than they should. Of the differences, the following are especially worthy of note. They involve forms found in the Pocahontas list but not in the Abingdon list: two species of *Pentremites (P. pulchellus* and *P. aff. pyriformis), Platycrinus Huntsvillae,* the *Rhipidomella* and *Schizophoria* already emphasized, *Chonetes Oklahomensis, Diaphragmus elegans* (which is abundant), *Martinia contracta,* and possibly a few other forms. Less important are *Syringopora* n. sp., *Campopyllum* (?) sp., and *Moorefieldella Eurekensis* (?) found in the Abingdon list but not in the other. Some of these differences we shall see extinguished later on. The following list, therefore, represents what may be called the *Pustula Genevievensis* fauna in the Abingdon quadrangle based on four collections from the lower Newman about 400 feet above the base (lots 887, 888, 888b, 1516):

Syringopora n. sp.
Triplophyllum Pellense

Campophyllum (?) sp.
Hederella (?) sp.
Spirorbis nodulosa
Fistulipora n. sp. (?)
Fistulipora aff. compressa
Stenopora aff. rudis
Stenopora aff. ramosa
Ptilopora sp.
Fenestella tenax
Fenestella sp.
Rhombopora sp.
Orthotetes Kaskaskiensis
Productus inflatus
Productus ovatus
Pustula Genevievensis (?)
Moorefieldella Eurekensis (?)
Spirifer Pellensis
Spiriferina Salemensis (?)
Composita trinuclea
Cliothyridina sublamellosa

Other collections from the Abingdon quadrangle might have been used to enlarge the foregoing list of species, either because they contained *Pustula Genevievensis* or *Pustula inflatus,* in abundance or showed a general agreement in other respects, but these four are especially typical. On the other hand, some of the Abingdon collections do not present this peculiar facies, even though they come from the lower part of the Newman and may represent almost the same geologic horizon. These, as I have said, are too numerous to be considered here separately and too varied to be considered together as a composite fauna. One of these collections, however, may be cited as fairly representative of the rest, its startigraphic position being about 200 feet above the base of the Newman (lot 886):

Triplophyllum sp.
Fenestella tenax
Polypora sp.
Dichotrypa (?) sp.
Schellwienella (?) n. sp.
Productus ovatus var. minor
Girtyella brevilobata
Spirifer Pellensis
Reticularia setigera
Composita trinuclea
Cliothyridina sublamellosa
Allerisma sp.
Caneyella Vaughani (?)
Aviculipecten n. sp.

Aviculipecten sp.
Platyceras Chesterense (?)
Griffithides sp.

Although these two lists serve to illustrate the general character of the Newman fauna (both of them being, however, of the lower Newman), it seems well worth while to cite a few forms of special interest from other collections, without, however, listing the entire fauna. A collection from Station 881 (about 175 feet above the base of the Newman) contains other specimens of the *Campophyllum* and the *Syringopora* already listed in the *Pustula Genevievensis* fauna, the *Syringopora* occurring likewise in several other collections. The same collection contains a few small specimens of *Chonetes*, which may be young specimens of the larger form cited from the Pocahontas quadrangle as *Chonetes Oklahomensis.* Apparently the same species cited as *Moorefieldella Eurekensis* (?) in my list from this quadrangle illustrating the *Pustula Genevievensis* fauna occurs in several other collections, one being Lot 948 from a horizon 300 feet above the base of the Greenbrier. These specimens are more numerous and more perfect than the others and seem to verify the identification. The species is at least extremely similar to *Moorefieldella Eurekensis.* A fairly complete dorsal cup of *Platycrinus Huntsvillae* occurs in Lot 885 representing a horizon about 175 feet above the base of the Newman, and a few small *Pentremites* apparently belonging to the same species as that found near Bluefield and identified as *Pentremites pulchellus,* occur in Lot 859, 400 feet above the base of the Newman. The only specimens that can definitely be identified as *Diaphragmus elegans,* or indeed that can be referred to *Diaphragmus* at all, were collected at Station 860 from a horizon 960 feet above the base of the formation. These occurrences add materially to the agreement between the faunas from the lower Newman of the Abingdon quadrangle and that apparently coming from the upper Greenbrier of the Pocahontas quadrangle found near Bluefield (lot 628).

The upper part of the Greenbrier as exemplified in the collections from the Huntersville, Buckhannon, and Piedmont quadrangles is obviously of Chester age, and, though it would be of interest to determine if possible which of the numerous subdivisions of the Chester the upper part of the Greenbrier represents, it seems more interesting to determine, if possible. whether other parts of the formation represent the Chester or some earlier geologic epoch.

The fauna, which for purposes of designation may be called the *Pustula Genevievensis* fauna and which is represented by collection 628 near Bluefield and apparently by several collections in the lower part of the Newman Limestone in the Abingdon quadrangle, especially invites consideration in this connection. In both areas this fauna or other faunas occurring at about the same horizon contain *Platycrinus Huntsvillae*, identified not by means of the elliptical marginally serrate columnars but by means of fairly complete dorsal cups. This species should at once identify the horizon as Ste. Genevieve, because *Platycrinus Huntsvillae* appears to be regarded as absolutely diagnostic of that fauna, being almost everywhere present in the formation and having been identified in no other. Mr. Butts, however, implies that it is found, though rarely, in the "Upper O'Hara."[3] I may say in passing that it seems to me the importance attached to the *crinoids* in correlating parts of the Chester and more recently to the *Pentremites,* sometimes to the neglect of other evidence, is unguarded and out of proportion. It has yet to be shown that the genus *Pentremites* is more valuable in correlation than other genera, such as *Productus,* and I doubt whether the *Pentremites* offer as many measurable characters for specific determination as the *Producti.*

The apparently abrupt entrance of the large *Pustula* of the *alternata* type *(P. Genevievensis ?)* and certainly its great abundance are striking features of this (lot 628) and other local faunas in the Appalachian region, and, while the importance of this one species might readily be overestimated, it often seems to occur with a more or less definite and distinctive association of forms that constitute a recognizable fauna. Other instances of the occurrence of this fauna have

[3]Butts, Charles. Kentucky Geological Survey; Mississippian Series in Western Kentucky, 1917, p. 55.

already been noted in the Abingdon quadrangle. Even more to the point are three occurrences near Huntsville, Alabama. One collection was made along the Monte Sano road about 60 feet above the base of a series of oolitic beds that are commonly regarded as of Ste. Genevieve age. This collection contains the following (lot 1564):

Stenopora sp.
Schizophoria n. sp.
Orthotetes Kaskaskiensis
Streptorhynchus (?) sp.
Pustula Genevievensis
Diaphragmus elegans
Dielasma sp.
Spirifer Pellensis
Reticularia setigera

Stratigraphically the horizon of this collection is in the Ste. Genevieve, but *Platycrinus Huntsvillae* has not been recognized in it.

A number of complete specimens of that crinoid, dorsal cup, arms, and all, were, however, found at a locality eight miles south of Huntsville in the lower part of the Ste. Genevieve, as there developed. The collection is a small one, *Platycrinus* being the most abundant species, of which the others are (lot 1590):

Triplophyllum spinulosum
Platycrinus Huntsvillae
Eupachycrinus (?) sp.
Fenestella sp.
Pustula Genevievensis
Productus aff. Keokuk
Dielasma sp.
Spirifer Pellensis
Spirifer increbescens
Reticularia setigera
Platyceras sp.

Besides *Platycrinus Huntsvillae* and *Pustula Genevievensis* (of which only one specimen was collected) mention should be made of the form identified as *Productus aff. Keokuk,* which apparently occurs also near Bluefield (Lot 628) and near Cedar Bluff (Lot 2013). The specimens are of the same general type, but they are not well preserved, and the specific identity can not be pressed.

A third collection was made in some marly beds near the middle of the Ste. Genevieve, about 9 miles south of Huntsville. This collection gives by far the largest fauna of the three, but, as the specimens were found weathered free, a possibility exists that some (probably a very few or none at all) drifted down from a higher horizon. This fauna comprises the following species (lot 1572):

Triplophyllum spinulosum
Pentremites pulchellus
Pentremites pulchellus var.
Pentremites Godoni (of Ulrich)
Platycrinus Huntsvillae
Fistulipora sp.
Stenopora sp.
Rhipidomella dubia
Schizophoria n. sp.
Orthotetes Kaskaskiensis
Chonetes Oklahomensis
Pustula Genevievensis
Productus parvus
Productus ovatus
Productus inflatus (?)
Diaphragmus elegans
Spirifer Pellensis
Spirifer aff. Washingtonensis
Spiriferina spinosa
Reticularia setigera
Composita trinuclea (?)
Cliothyridina sublamellosa
Eumetria vera
Platyceras sp.

The following forms are especially to be noted, *Pentremites pulchellus, Platychrinus Huntsvillae* (identified only by the serrated columnars, *Rhipidomella dubia, Schizophoria* n. sp., *Chonetes Oklahomensis* (?), *Pustula Genevievensis* (abundant), and *Productus inflatus* (rather rare and not with certainty identifiable).

These three faunas all come from the *Platycrinus Huntsvillae* zone near Huntsville, and taken together they show so many of the peculiarities of the *Pustula Genevievensis* fauna in West Virginia (Lot 628 in the Pocahontas quadrangle) and Virginia (several lost in the Abingdon quadrangle) as to justify a tentative conclusion that they are all of the same age. The conclusion can only be called tentative, even though it seems at present well supported, because the correlation is made at rather long range and because, before the primary data for really sound conclusions are available, numerous facts need to be collected and compared in this region, which is little better than terra incognita to the paleontologist so far as recorded investigations are concerned. Among the noteworthy differences is the presence of *P. inflatus* which is abundant in most of the northern faunas and decidedly rare in those from Huntsville.

Still another fauna, quite remarkable in its way, is of importance in the present discussion. It was gathered at Trinity, Alabama, and the geologic horizon seems to be essentially the same as that of the collections listed from near Huntsville. A partial list of this fauna is as follows (lot 334):

Triplophyllum Pellense
Michelinia Meekana
Platycrinus Huntsvillae
Conularia Chesterensis
Lingulidiscina Batesvillensis
Crania Chesterensis
Rhipidomella dubia
Rhipilomella Nevadensis
Schizophoria aff. Swallowi
Schuchertella submucronata
Derbya ambigua
Chonetes Oklahomensis
Productus inflatus
Productus ovatus
Productus Adairensis
Avonia Arkansana var. multilirata
Pustula Genevievensis
Diaphragmus elegans var.
Camarotoechia Purduei
Dielasma Arkansanum
Spirifer Pellensis
Syringothyris Roundyi
Spiriferina transversa
Spiriferina spinosa var. Siebenthali
Composita trinuclea
Cliothyridina sublamellosa
Eumetria vera

Many features of this fauna are unusual. Some are common to the related faunas already cited and need not be pointed out again. Among the novel features are a large fine species of *Schuchertella* and a new species of *Syringothyris*, a genus heretofore supposed to end with the Warsaw, although, as a matter of fact, it occurs in formation of Chester age in Arkansas, the Pitkin Limestone.

The conclusion may be tentatively entertained that all these faunas, which show so marked a relationship to one another, are to be correlated with the Ste. Genevieve of Alabama. If so, they ought to agree with the Ste. Genevieve faunas of the Mississippi Valley, at least better than with any other faunas from that region, for my lists will make it appear to anyone at all acquainted with the subject that we have here faunal assemblages markedly different from any of those known from the typical Mississippian sections, recalling in fact the faunas of Arkansas more than those of Illinois and Missouri.

The faunas that I am here considering, however, have more in common with the Gasper fauna than with the Ste. Genevieve (Fredonia fauna) as those faunas are listed by Mr. Butts[4]. Only two types, *Platycrinus Huntsvillae* and *Rhipidomella dubia*, markedly connect them with the Ste. Genevieve rather than with the Gasper, whereas many connect them with the Gasper rather than with the Ste. Genevieve, for instance, *Chonetes sericeus* (which may be the same as *Chonetes Oklahomensis*), *Productus inflatus*, *Productus Adairensis*, *Productus Arkansanus* (which may be the same as *Productus aff. Keokuk* or a variety of it), and *Brachythyris Ozarkensis* (to which a few poorly preserved specimens from the Abingdon quadrangle may belong). Among the noteworthy differences are the absence of *Archimedes*, of which three species are cited from the Gasper; the absence of *Agassizocrinus*, of which one species is cited from the Gasper; the smaller and quite different representation of *Pentremites*, of which four species are cited from the Gasper; and the absence of *Talarocrinus*, of which four species are cited from the Gasper, although in the other collection from near Bluefield (lot 3221), which was obtained but a little higher in the section than lot 628, *Talarocrinus* does occur as well as *Pentremites*.

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[4]Kentucky Geological Survey. Mississippian Series in Western Kentucky, 1917; page 56.

Much the same conclusions are suggested by comparison of my faunas with the faunas listed by Professor Weller[5]. The chief points of affinity with the Ste. Genevieve fauna as against many of difference consist in *Rhipidomella dubia* and *Platycrinus penicillus (=P. Huntsvillae)*, which are common to both, and are not found above the Ste. Genevieve in the faunal sequence described by Professor Weller. These Appalachian faunas seem to have more in common with Weller's Shetlerville fauna or the Renault fauna. The higher fauna from near Bluefield (Lot 3221) in some respects strikingly suggests the Paint Creek fauna.

Although the evidence is, so to speak, promiscuous, in a general way at least it may be said that all the closest affinities of this fauna are with the faunas that in the Mississippi Valley occur below the Cypress Sandstone, with the Ste. Genevieve, the Shetlerville and the Renault (which Professor Weller characterizes as a Chester fauna without *Archimedes*), but this fauna seems to combine in itself peculiarities that in those occur separately, so that it can not, in our present knowledge of the facts, be correlated exclusively with any one, without contradictions in the evidence. It may conceivably represent the period of time covered by all those formations combined, but although it really appears, as I have just pointed out, to have more conspicuous points of resemblance to the Renault, the more conservative course seems to be to hold that the beds characterized by this fauna correspond in part at least to the Ste. Genevieve Limestone.

The basal beds of the Greenbrier contain at a number of points over a wide area corals of the *Lithostrotion* type in more or less abundance. These corals have been found at Mill Point in the Huntersville quadrangle and near both Cedar Bluff and Shrader in the Tazewell quadrangle, a distance of about 120 miles. Other localities that might be mentioned would extend the area within which occurrences of these corals in the basal part of the Greenbrier have been observed. On the other hand, they have not been observed in any of my

[5]This discussion has to some extent been anticipated by that on pages 463-4 dealing with a fauna from near Bluefield (lot 628) in which many of the same forms occur.

collections from the Abingdon quadrangle. Corals of the *Lithostrotion* group are considered especially diagnostic of the St. Louis horizon, and these occurrences raise the question whether the basal part of the Greenbrier is not of a different geologic age from the rest, and whether that age is not St. Louis.

At Cedar Bluff the *Lithostrotions* occur in a thin but definite bed of limestone below a bank of shales which inclose a fauna that for the present may be regarded as not older than the Ste. Genevieve. At Shrader, only about 10 miles away, the rich and peculiar fauna just referred to does not appear at the same horizon, and the *Lithostrotions*, instead of occurring by themselves, are associated with a meager fauna. Their stratigraphic relation to the Kimberling Shale, however, is about the same as at Cedar Bluff. At Mill Point, likewise, they occur associated with a meager and colorless fauna. The occurrence of these fossils at Shrader and especially Mill Point, however, was such that the corals and other fossils may have had their source in distinct though narrow zones, though I think it highly improbable that they did or that the zones would have differed materially in geologic age. It seems hardly necessary to consider further the hypotheses either that the *Lithostrotion-bearing* bed at Cedar Bluff is something distinct in its significance from the two other occurrences of *Lithostrotion* in this region, or that in the two other occurrences the *Lithostrotions* are to be considered apart from the faunas with which, in the collections at least, they are associated.

Although the *Lithostrotions* are considered especially diagnostic of the St. Louis horizon (*L. basaltiforme* apparently not having been reported from any other), *L. proliferum* has been cited by Ulrich as occurring in the Spergen Limestone below and by Butts as occurring in the basal part of the Ste. Genevieve above. If these data are to be relied upon, it would seem that in certain sections rocks as old as the St. Louis age have been included in the Greenbrier, because, though both types of corals appear to be present in the Greenbrier, the one composed of polygonal corallites compressed into a solid mass *(L. basaltiforme)* is the more abundant and the more definitely recognized. Tending in the same direction is the presence of the bryozoan genus *Dichotrypa,* a genus which is especially characteristic of the St. Louis fauna and has not been cited from any subsequent fauna. On the other hand, *Dichotrypa* occurs in the section at Cedar Bluff, above the *Lithostrotion* bed associated with a fauna (lot 2013) which one would hesitate to call St. Louis, while at Mill Point certainly, and at Shrader probably, a species of *Diaphragmus* is found in these basal beds, a type of *Productus* that is not at present known below the Ste. Genevieve. It is true, however, that at Mill Point (Station 3282a) the form in question does not actually occur in the same collection as the *Lithostrotion* and at Shrader (2020a) the form is not definitely identified as *Diaphragmus.* However, the general similarity of this fauna (aside from *Lithostrotion*) to the higher faunas and the general dissimilarity to the St. Louis fauna make is unnecessary to entertain at this time the hypotheses that these beds containing *Lithostrotion* are of St. Louis age. Indeed, so far as *Lithostrotion* is concerned, the fact has already been noted that the ramose type is recorded as ranging up into the basal Ste. Genevieve, and it requires little stretching of the probabilities to accept the massive type as having a similar range. The *Dichotrypa,* as just mentioned, does occur in this area above the *Lithostrotion* (at Cedar Bluff, Station 2013) in a fauna which does not remotely resemble the ordinary St. Louis fauna, although it is so singular in many respects as not closely to resemble any fauna of the typical Mississippian section, and although it is not without suggestions of the Spergen and St. Louis faunas. I would tentatively conclude that the basal part of the Greenbrier, even these beds with *Lithostrotion,* belong to the Ste. Genevieve epoch.

Bearing upon this same question is the fact that at Cedar Bluff the Greenbrier is supposed to rest unconformably on the Kimberling, the Pulaski Shale, which in other sections occurs below the Greenbrier, and the Price Sandstone, which occurs below the Pulaski, being at that locality absent. The fauna of the Pulaski Shale, and, consequently its geologic age are not definitly known to me, because so far as I am aware no paleontologic evidence has been obtained from the typical area. I have, however, a number of collections from beds supposed to correspond to the Pulaski Shale in the Abingdon quadrangle (there called the Maccrady formation) which show another novel and puzzling fauna. I shall here attempt only to epitomize these collections. They were made in beds of a shaly nature that had been subjected to considerable pressure. The fossils consequently are apt to be much flattened and distorted. Most of them represent pelecypod or gastropod types which are either new species or indeterminable, At some localities there are *bryozoa,* especially *Fenestelloids.* At only one locality has a brachiopod fauna been observed, though a few brachiopod species occur in many of the collections. One of the most common and at the same time the most noteworthy of these species is a finely ribbed *Rhynchonelloid,* which seems to be identical with *Moorefieldella Eurekensis.* The same form, though in much smaller numbers, occurs also in the lower part of the Newman. Another persistent form is a finely striated *Chonetes* related to *Illinoisensis.* Associated with these are one or two *Producti* of the *semireticulatus* group, of which a small finely costate type suggests *P. Altonensis,* and a large one with coarser ribs, *P. inflatus,* though neither species can be certainly identified on the material. *Producti* of another type are also fairly common, some suggesting *P. setiger,* some *P. Keokuk,* and some *P.* (or *Avonia*) *Arkansanus var. multiliratus.* A *Syringothyris* occurs in the collection just mentioned as chiefly displaying a brachiopod facies. A good-sized *Camarotoechia* related to *C. Purduei,* has been noted here and there, also, a new species of *Spiriferina. Spirifers* are more or less abundant, particularly a species related to *S. Pellensis,* though another form resembling *S. bifurcatus* occurs in one collection. The inevitable *Productus ovatus* completes the list except that there yet remains to be mentioned *Worthenopora spinosa,* a species which though described from the Keokuk, has been collected by Mr. Butts in beds identified as Warsaw, Spergen, and even St. Louis. I would hesitate to assign any geologic age to this fauna definitely, though it impresses me (upon very unsubstantial evidence. I must confess) as more probably Warsaw.

The fauna of the Price Sandstone I know only from collections made in this same area, the Abingdon quadrangle. These collections seem to present faunas of both Carboniferous and Devonian ages; indeed, the locality label accompanying one of the collections states that the horizon is 260 feet above the base of the Price Sandstone and 68 feet above the base of the Carboniferous. The Carboniferous faunas are not large or diagnostic, but so far as they go they appear to be essentially the same in character and in age as a collection not yet cited made near Cedar Bluff close to the Cedar Bluff collections that have so many times been mentioned. The collection here referred to (Lot 3223) contains a varied fauna of the type of the Ohio Waverly (especially the Cuyahoga Shale), and in geologic age I would judge it to be at least older than the Keokuk, more probably upper Kinderhook or lower Burlington.

Now this collection from Cedar Bluff (lot 3223) comes from beds mapped as Kimberling Shale and apparently from near the top of those beds, yet it seems to be the same fauna as that shown by the collections from the Price Sandstone (Abingdon quadrangle) and is almost certainly younger than the faunas from the lower part of the Price, which formation nevertheless is supposed to overlie the Kimberling. The natural inference would be that in some areas the Price fails to show its massive character and has been mapped as Kimberling, and that the Price and the Kimberling are in some areas and in some measure the same. Certainly a doubt is raised whether in the section near Cedar Bluff the unconformity below the Greenbrier actually involves the absence of the Price Sandstone, and this in turn suggests the further question whether if the upper Price is actually represented by the upper Kimberling, the Maccrady is not also present in an altered and unrecognized form. It would be hazardous in a region where so much in the way of faunal paleontology remains to be found out to maintain at present that no such thing occurred, but in the paleontologic evidence available I find no support for such a hypothesis. The Maccrady fauna differs remarkably not only from the earlier faunas of the Greenbrier Limestone but from any Mississippian faunas known from this general region. This fact, however, contains a hint that the Maccrady fauna is intensely modified and may elsewhere be represented by an association of species so different that until the faunal intergradations, which presumably exist, have been traced out, their equivalence is not likely to be recognized.

According to present evidence then there does exist in the section at Cedar Bluff an unconformity or a time break at the base of the Greenbrier represented in part at least by the absence of the Maccrady formation. The same unconformity doubtless extends to other areas where the Greenbrier has been mapped. The existence of this unconformity as well as the evidence of paleontology, feeble and contradictory as that evidence in some respects doubtless is, lends support to the identification as Ste. Genevieve of even these basal beds of the Greenbrier with their *Lithostrotion* corals, because a widespread unconformity has been reported as occurring below the Ste. Genevieve Limestone[6]. Mr. Ulrich[7] in the work above cited states that this unconformity causes the entire St. Louis to be missing near Huntsville, Alabama. In the same way the St. Louis may be missing in the region under consideration, and the interval may even be greater so as to involve the Spergen and the Warsaw as well, though in the present state of our knowledge no stress can be laid on the assignment of the Maccrady formation to the Warsaw epoch.

The tentative conclusion that the *Pustula Genevievensis* fauna which occurs in the lower part of the Newman Limestone of the Abingdon quadrangle is the same as the *Pustula Genevievensis* fauna which occurs in the upper part of the Greenbrier Limestone of the Pocahontas quadrangle, and that both are of Ste. Genevieve age, involves two collateral issues and the truth or falsity of these corallaries, when proved, will have a bearing upon the truth or falsity of that conclusion. The faunas obtained near the top of the Greenbrier at Mill

[6]Butts, Charles, Kentucky Geological Survey, Mississippian Series in Western Kentucky, 1917; page 46.

[7]Ulrich, E. O., Bulletin Geological Survey of America, Volume 22, 1911; page 512.

Point and in the Buckhannon and Piedmont quadrangles are certainly of a markedly different type from the *Pustula Genevievensis* faunas just mentioned and appear to have a distinctly younger facies. As the *Pustula Genevievensis* fauna occurs in the upper part of the Greenbrier near Bluefield, would not this fact suggest that the upper Greenbrier, let us say in the Mill Point section, is younger than the upper Greenbrier at Bluefield and correlates perhaps with the Bluefield formation? This question is merely raised by the incomplete paleontological evidence but is not answered by it.

Again, though this is based upon a somewhat different correlation, in the Pocahontas folio the Greenbrier is represented as having its outcrop terminated by a fault along its southeastern border. On its northwestern side its relation to the Bluefield Shale is normal. The formation does not have its usual thickness in this region (near Bluefield), and evidently only its upper portion was thought to be present. On its faulted side it is in contact with the Kimberling Shale, both formations being on edge and where I saw them showing no marked difference in dip or strike. These field relations continue thus well nigh across the Tazewell quadrangle to the southwest, but, whereas the contact between the Greenbrier and Kimberling is represented as due to a fault entirely across the Pocahontas quadrangle and half way across the Tazewell, the rest of the distance it is represented as due to an unconformity, the same beds being eliminated in both areas, the Maccrady formation and Price Sandstone. In spite of its great individuality the fauna collected at Cedar Bluff (lot 2013) shows so many points of resemblance to the lower Newman of the Abingdon quadrangle and the upper Greenbrier of the Pocahontas quadrangle that a general correlation is suggested, again a very tentative correlation. Still the Cedar Bluff fauna can hardly be as old as St. Louis, and the two other faunas may conservatively be called Ste. Genevieve.

If the partial identity of the faunas indicates that the horizon at Cedar Bluff and the horizon at Bluefield (lot 628) are really to be correlated, there would seem to be less reason for interpreting the stratigraphic relations between the Greenbrier and the Kimberling in so different a manner at these two localities, although of this one can hardly be judge, because the reasons for the original interpretation are not given. Under the alternative hypothesis just suggested the facts would not be that the upper part of the Greenbrier was present in one section and the basal part in the other, but the same bed in both, and apparently in contact with about the same horizon in the Kimberling.

## List of Localities Cited in the Preceding Report.

334 Quadrangle not published. Limestone quarry near Trinity, Morgan County, Alabama. Bangor Limestone.

628 Pocahontas quadrangle. Railroad cuts northeast of Bluefield, West Virginia. Chiefly from 1½ to 2 miles from station. Apparently from very top of Greenbrier Limestone.

695 Buckhannon quadrangle. Headwaters of Big Run, 2½ miles above Elkwater on trail over Mill Mountain.

696 Buckhannon quadrangle. Cliff east of Mill Creek Valley.

701 Piedmont quadrangle. Youghiogheny bluff southeast of Crellin, at junction of Rhine Fork and Cherry Creek.

730a Buckhannon quadrangle. Bradys Gate near Blue Spring, West Virginia.

886 Abingdon quadrangle. Saltville Gap. Shaly limestone, top of section in railroad cut. Lower part of Newman Limestone.

887 Abingdon quadrangle. Saltville. Newman Limestone.

888 Abingdon quadrangle. Saltville, Virginia. Newman Limestone.

888b Abingdon quadrangle. Essentially the same as 888.

1516 Abingdon quadrangle. Hill ½ mile north of Saltville, Virginia. Newman Limestone.

1564 Huntsville quadrangle. Monte Sano road near Huntsville, Alabama. Middle part of Ste. Genevieve Limestone.

1572 Huntsville quadrangle. Monte Sano ridge, 9 miles south of Huntsville, Alabama. Middle of Ste. Genevieve Limestone.

1590 Huntsville quadrangle. Small hill 8 miles south of Huntsville, Alabama. Lower part of Ste. Genevieve Limestone, but above oolite.

2013 Pounding Mill quadrangle. Railroad cut 1 mile northeast of Cedar Bluff, Virginia. Greenbrier Limestone.

2015 Pounding Mill quadrangle. ¼ mile south of Bandy, Virginia. Greenbrier Limestone.

2020a Tazewell quadrangle. ½ mile southeast of Shrader, Virginia. Very basal part of Greenbrier.

3221 Pocahontas quadrangle. Along wagon road and trolley line from 2 to 2½ miles northeast of Bluefield, West Virginia. Apparently the upper part of the Greenbrier Limestone.

3282 Huntersville quadrangle. From various points within 1 mile west and southwest of Mill Point, West Virginia. Lower part of the Greenbrier Limestone.

3282a Huntersville quadrangle. Same as 3282. Collected at a single locality. Base of the Greenbrier Limestone.

3283 Huntersville quadrangle. Small hill just north of residence of Mr. Wallace, Mill Point, West Virginia. Base of Greenbrier Limestone.

3284 Huntersville quadrangle. Old lumber railroad up Stamping Creek northwest of Mill Point, West Virginia. 50 feet below top of Greenbrier Limestone.

3285 Huntersville quadrangle. Same as 3284. 75 feet below the top of Greenbrier Limestone.

3286 Huntersville quadrangle. Same as 3284. 85 feet above the top of Greenbrier Limestone.

3287 Huntersville quadrangle. Same as 3284. 157 feet above the top of Greenbrier Limestone.

3294 Huntersville quadrangle. Same as 3284. 100 feet above the top of Greenbrier Limestone.

# APPENDIX.

## LEVELS ABOVE MEAN TIDE.

### RAILROAD LEVELS.

### WESTERN MARYLAND RAILWAY.

Main Line.

| Miles from Baltimore. | Stations | County. | Elevation. |
|---|---|---|---|
| 224.1 | Bayard | Grant | 2356 |
| 226.6 | Wilson | Grant | 2514 |
| 228.1 | Dobbin | Grant | 2606 |
| 229.3 | Henry | Grant | 2656 |
| 231.3 | Wilsonia | Grant | 2736 |
| 233.1 | Beechwood | Grant | 2866 |
| 235.9 | Fairfax | Grant | 3050 |
| .... | Fairfax Summit | Grant-Tucker | 3070 |
| 237.5 | William | Tucker | 2996 |
| 239.6 | Thomas | Tucker | 2956 |
| 240.5 | Coketon | Tucker | 2872 |
| 241.4 | Douglas | Tucker | 2806 |
| 249.6 | Hendricks | Tucker | 1712 |
| 250.5 | Hambleton | Tucker | 1694 |
| 252.9 | Parsons | Tucker | 1656 |
| 255.5 | Porterwood | Tucker | 1706 |
| 256.9 | Moore | Tucker | 1780 |
| 261.5 | Haddix Summit | Randolph | 2193 |
| 263.1 | Montrose | Randolph | 2000 |
| 267.9 | Kerens | Randolph | 1953 |
| 269.5 | Whyte | Randolph | 1940 |
| 270.8 | Gilman | Randolph | 1934 |
| 272.4 | Read | Randolph | 1926 |
| 274.7 | Elkins | Randolph | 1933 |

Davis Branch.

| Miles from Baltimore. | Stations | County. | Elevation. |
|---|---|---|---|
| 239.6 | Thomas | Tucker | 2956 |
| 242.2 | Childs | Tucker | 3070 |
| ..... | Dobbin Ridge Summit | Tucker | 3121 |
| ..... | Kent Ridge Summit | Tucker | 3153 |
| 245.9 | Davis | Tucker | 3093 |

Central West Virginia & Southern Railroad.

| Miles from Hendricks | Stations | County. | Elevation. |
|---|---|---|---|
| 0.0 | Hendricks | Tucker | 1713 |
| 3.7 | Red Run | Tucker | 1816 |
| 4.8 | Moores Siding | Tucker | 1846 |
| 6.0 | Richford | Tucker | 1876 |
| 7.5 | Mill Run | Tucker | 1907 |
| 8.3 | Elk Lick | Tucker | 1919 |
| 9.9 | Gladwin | Tucker | 1969 |
| 13.0 | Jenningston | Tucker | 2055 |
| 15.0 | Scotts Siding | Tucker | 2113 |
| 17.0 | Red Creek Junction | Tucker | 2164 |
| 22.7 | Laneville | Tucker | 2500 |
| 17.0 | Red Creek Junction | Tucker | 2164 |
| 21.1 | Harman | Randolph | 2336 |
| 24.6 | Hazelwood | Randolph | 2507 |
| 26.4 | Job | Randolph | 2581 |
| 28.7 | Gandy | Randolph | 2677 |
| 29.5 | Armentrout | Randolph | 2720 |
| 30.7 | Whitmer | Randolph | 2760 |
| 31.3 | Horton | Randolph | 2775 |

## U. S. GEOLOGICAL SURVEY LEVELS.

The primary levels published on the following pages for the Belington, Kingwood, and Parsons Quadrangles are taken from Bulletin 632 of the United States Geological Survey, those for the Belington Quadrangle appearing on page 22, Kingwood, page 20, and Parsons, pages 21-22.

Additional levels for the Horton, Davis, and Onego Quadrangles, which have been submitted to the West Virginia Geological Survey in manuscript form by the Director of the United States Geological Survey, since the work was done subsequent to the publication of the report cited, are also given below.

The following remarks concerning "Classification". "Bench Marks", and "Datum", are taken from pages 5-6 of Bulletin 632, referred to above:

"**Classification.**—The elevations are classified as precise or primary, according to the methods employed in their determination. The former are determined by lines of levels run either in both forward and backward directions or by simultaneous double-rodded lines, a high-grade instrument being used and special precautions being taken in observations and reduction to correct errors and make the line continuously good throughout. The latter or primary levels are determined with the Y level, precautions being taken against only the principal errors and the levels being run mostly in circuits of single lines. The allowable limit of error observed on the precise work already done by the Geological Survey in this State is represented in feet by 0.02 √D, and that for the primary work by 0.05 √D, in which D is the length of circuit in miles.

"**Bench Marks.**—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet, 3½ inches in diameter and ¼ inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock in the wall of some public building, a bridge abutment, or other substantial masonry structure. The second form, used where masonry or rock is not available, consists of a hollow wrought-iron post 3½ inches in outer diameter, and 4 feet in length. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted upon the top of the post which is set about 3 feet in the ground. A third style of bench mark, with abbreviated lettering, is used for unimportant points. This consists of a special copper nail 1½ inches in length driven through a copper washer ⅞ inch in diameter. The tablets as well as the caps on the iron posts are appropriately lettered, and cooperation by States is indicated by the addition of the State name.

"The numbers stamped on the bench marks described in the following pages represent the elevations to the nearest foot as determined by the levelman. These numbers are stamped with 3/16-inch steel dies on the tablets or post caps, to the left of the word 'Feet'. The office adjustment of the notes and the reduction to mean sea-level datum may so change some of the figures that the original markings are 1 to 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United State Geological Survey, at Washington, D. C., for the adjusted values, and will use the markings as identification numbers only.

"**Datum.**—All elevations determined by the United States Geological Survey and United States Coast and Geodetic Survey are referred to mean sea-level, which is the level that the sea would assume if the influence of winds and tides were eliminated. This level is not the elevation determined from the mean of the highest and the lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called the half-tide level. **Mean sea-level is the average height of the water, all stages of the tide being considered.** It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long, narrow bays, rivers, and like features, will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar month, and if accuracy is desired they must extend over several years. At ocean stations the half-tide level and the mean sea-level usually differ but little. It is assumed that there is no difference between the mean sea-levels determined from observations in the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean.

"The connection with tidal stations for bench marks in certain areas that lie at some distance from the sea-coast is still uncertain, and this fact is indicated by the addition of a letter or word to the right of the word 'Datum' on tablets or posts. For such areas corrections for published results will be made from time to time as the precise-level lines of the United States Geological Survey, the United States Coast and Geodetic Survey, or other Government organizations are extended."

### BELINGTON 15′ (ST. GEORGE 30′) QUADRANGLE.

(Latitude 39°-39° 15′; longitude 79° 45′-80°).

#### From Moore Station along Western Maryland R. R. to Kerens (spur line, checked).

Feet.

**Montrose**, 0.2 mile northeast of station, in second step from top of coping stone of northeast wing wall of railroad bridge; bronze tablet stamped "1997 Adj 1903"..........1,996.424

**Kerens**, in front of station; top of rail.....................1,945.8

**Kerens**, 350 feet south of station, in southwest bridge seat of iron bridge; bronze tablet stamped "1944 Adj 1903"....1,943.618

#### From Montrose west along public road.

**Montrose**, 1.5 miles west of, in foundation stone of east end of Mathias Skidmore's residence; aluminum tablet stamped "2049 Adj 1903"....................................2,048.840

### KINGWOOD 15′ (ST. GEORGE 30′) QUADRANGLE.

(Latitude 39° 15′-39° 30′; longitude 79° 30′-79° 45′).

#### From Terra Alta south along highways via Aurora and Horseshoe Run to summit of mountain near Preston-Tucker County Line[1].

**Horseshoe Run**, 1 mile southwest of post-office in north side of stone foundation of church; bronze tablet stamped "2686 Adj, 1903"..........................................2,685.237

### PARSONS 15′ (ST. GEORGE 30′) QUADRANGLE.

(Latitude 39°-39° 15′; longitude 79° 30′-79° 45′).

#### From mouth of Licking Creek along highways up Cheat River to Parsons.

**Hannahsville**, 3.1 miles south of, west side of road at turn, in outcrop of rock; bronze tablet stamped "1659 Adj 1903".1,659,065

**St. George**, in south end of east abutment of iron bridge over Cheat River; bronze tablet stamped "1553 Adj 1903".....1,552.614

**St. George**, 2.6 miles east of, iron bridge over Horseshoe Run, near mouth, in northwest wing wall of concrete abutment; aluminum tablet stamped "1576 Adj 1903"..............1,575.906

**Parsons**, 2 miles north of, iron highway bridge over Cheat River, in northeast bridge seat; bronze tablet stamped "1614 Adj 1903"......................................1,613.690

**Parsons**, 900 feet east of, iron railroad bridge over Cheat River, in second step of southwest coping stone; bronze table stamped (erroneously) "1550 Adj. 1903"...........1,649.387

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[1]An excessive error is distributed in this line.

### Up Horseshoe Run along highway to top of mountain.[2]

Feet.

**Lead Mine,** 1 mile south of, in southeast bridge seat of iron highway bridge; aluminum tablet stamped "1727 Adj 1903" ....................1,726.642

**Lead Mine,** 2.4 miles northeast of, 970 feet north of intersection of road near mouth of Wolf Run, on west bank of Horseshoe Run, in ledge of rock; aluminum tablet stamped "1872 Adj 1903"....................1,871.911

**Lead Mine,** 7 miles northeast of, on Hogback Mountain, in northwest corner of foundation of residence of David Ruth; aluminum tablet stamped "2482 Adj 1903".........2,482.056

### From Parsons along Western Maryland R. R. to Thomas.

**Hambleton,** road crossing at station; top of rail.............1,682.3

**Hendricks,** wagon bridge spanning Black Fork of Cheat River, in northwest bridge seat; aluminum tablet stamped "1721 Adj 1903"....................1,720.604

**Hendricks,** 2.5 miles northeast of, in second step of northeast wing wall of iron railroad bridge: aluminum tablet stamped "1910 Adj 1903"....................1,909.717

**Douglas (Albert),** 1.1 miles southwest of, at mile-post 81, in coping stone south side of east end of stone arch; aluminum tablet stamped "2631 Adj 1903"....................2,630.395

**Douglas,** in front of station; top of rail....................2,795.7

**Thomas,** in southwest corner of Davis Coal and Coke Company's office; aluminum tablet stamped "2986 Adj 1903"..2,986.062

### From Hendricks southeast along Dry Fork R. R. (now Central West Virginia and Southern Railroad) to Gladwin (unchecked spur line; elevations unreliable).

**Hendricks,** 3 miles southeast of, 900 feet north of mile-post 3, 100 feet east of railroad, 70 feet southeast of spring under oak tree, near two large chestnut trees, in boulder; aluminum tablet stamped "1788 Adj 1903"...............1,787.221

**Hendricks,** 6.4 miles southeast of, north of track, in side of cleft of rock; aluminum tablet stamped "1876 Adj 1903"...1,875.866

**Gladwin,** at west side of north end of wooden railroad bridge spanning Dry Fork, in large sandstone ledge; aluminum tablet stamped "1944 Adj 1903"....................1,943.365

### From Porterwood south to edge of quadrangle (single spur line).

**Pheasant Run** (former post-office), on right bank of Pheasant Run (Pleasant Run on original quadrangle), 100 feet upstream from wooden bridge, in large flat stone; aluminum tablet stamped "1738 Adj 1903"....................1,737.731

**Pheasant Run** (former post-office) (Pleasant Run on original quadrangle), 3 miles south of, 100 feet south of Harman Hanford's residence, on side of hill, 4 feet south of road, in ledge of rock; aluminum tablet stamped "1898 Adj 1903" ....................1,898.187

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[2]An excessive error is distributed in this line.

From Hannahsville southwest along public road.

Feet.

Hannahsville, west side of stone foundation of house owned by J. R. Loughry; bronze tablet stamped "1526 Adj 1903".1,525.126
Hannahsville, 3.3 miles southwest of, on north side of road at Licking Creek, at hollow, in outcrop of rock; bronze tablet stamped "1664 Adj 1903"............................1,663.672

From Parsons southwest along Western Maryland R. R. to Porterwood, thence west along same to point 1 mile west of Moore.

Moore Station, 1 mile west of, in northeast bridge seat of iron railroad bridge over Haddix Run; aluminum tablet stamped "1818 Adj 1903"...............................1,817.140

## HORTON QUADRANGLE.

(Latitude 38° 45′-39°; longitude 79° 30′-79° 45′).

From east border of quadrangle near Harperton northwest along highways to Harman, thence north along Central West Virginia and Southern R. R. to Gladwin (Parsons Quadrangle).

Harman, 1.4 miles east of, south side of road, in large rock; chiseled squae, painted "T. B. M. 2,567".................2,564.84
Harman, in front of M. J. Roy's store, in concrete curbing; bronze tablet stamped "2,362 W. Va.".................2,359.288
Harman, 1 mile north of, 380 feet south of road crossing, east side of railroad, in large rock; chiseled square, painted "T. B. M. 2,310"........................................2,307.27
Harman, 2.0 miles north of, north side of track, in telegraph-pole; railroad spike, "T. B. M. 2,265" painted on pole.....2,262.88
Harman, 2.9 miles north of, 15 feet south of railroad track, in large boulder on bank of Dry Fork; bronze tablet stamped "2,222 W. Va."...........................................2,220.061
Harman, 3.9 miles north of, at road crossing, west side of railroad track, in flat rock; chiseled square, "T. B. M. 2,183" painted on telegraph-pole.............................2,180.47
Red Creek Junction, north end of station platform, in large square post; copper nail and washer, painted "T. B. M. 2,164" ...............................................2,161.86
Red Creek Junction, 1.2 miles north of, 45 feet west of J. White's freight house, south side of track, in large pointed boulder; bronze tablet stamped "2,122 W. Va."........2,119.344
Red Creek Junction, 2.2 miles north of, 500 feet east of footbridge south side of railroad track; railroad spike, in telegraph-pole painted "T. B. M. 2,090"..................2,087.58
Jenningston, 0.4 mile west of station, north side of track, in ledge of rocks; chiseled square "T. B. M. 2,061" painted on ledge................................................2,058.27
Jenningston, 1,400 feet east of station, 50 feet south of railroad track, northeast corner of locomotive barn, in large flat rock; bronze tablet stamped "2,037 W. Va."..............2,034.730
Jenningston, 1.2 miles north of, 400 feet west of cabin, north side of track; railroad spike in telegraph-pole, painted "T. B. M. 1,996"......................................1,993.83
Gladwin, at north side of west end of wooden railroad bridge,

Feet.

spanning Dry Fork, in large sandstone ledge; aluminum tablet stamped "1,944"....................................1,943.365

From Red Creek Junction east along highway into Onego Quadrangle.

**Red Creek Junction,** 0.8 mile southeast of, at intersection of roads, northeast end of culvert, in flat stone; chiseled square, painted "T. B. M. 2,236"........................2,233.21

## ONEGO QUADRANGLE.

(Latitude 38° 45′-39°; longitude 79° 15′-79° 30′).

Grant, Pendleton, Randolph, and Tucker Counties.

From near east border of quadrangle over divide from North Mill Creek to Upper Tract on South Branch of Potomac River.

**Brushy Run Post-office,** 0.3 mile north of, 120 feet north of church, west side of road, in root of large oak tree; copper nail and washer, tree marked "T. B. M. 1,379"...........1,377.64

**Brushy Run,** 0.6 mile southwest of, south side of road, in stone step to John Miller's dwelling; chiseled cross, marked "T. B. M. 1,607"........................................1,606.22

**Brushy Run,** 1.4 miles southwest of, 50 feet south of gate leading to E. M. Kile's farm, 200 feet south of Kile Schoolhouse, in east side of road, in ledge of rock; bronze tablet stamped "1,523 W. Va.".................................1,521.770

**Brushy Run,** 2.4 miles southwest of, west abutment, north end of steel bridge over South Branch of Potomac; chiseled square, bridge marked "T. B. M. 1,422"..................1,420.32

**Brushy Run,** 3.4 miles southwest of, 70 feet southwest of small shanty, side of road, in large rock; chiseled square, marked "T. B. M. 1,502"....................................1,500.91

**Upper Tract Post-office,** 0.4 mile south of, 5 feet north of south door of schoolhouse, in small rock; bronze tablet stamped "1,495 W. Va."........................................1,494.254

From east border of quadrangle northwest along highways to Upper Tract.

**Upper Tract,** 1.7 miles east of, at second-class T road north, in northeast corner of forks, in root of walnut tree; copper nail, painted "1,486.3"..............................1,485.51

**Upper Tract,** 1.2 miles east of, on cement bridge over South Branch River, on west end of north rail; chiseled square, painted "1,435.2"........................................1,434.41

**Upper Tract,** 0.4 mile south of post-office, 5 feet north of south door of schoolhouse, in small rock; bronze tablet stamped "W. Va. 1,495"...................................1,494.254

From Upper Tract along highways southwest 6 miles up Reed Creek, thence west over North Fork Mountain to Riverton, thence northeast down North Fork of Potomac River to Mouth of Seneca. (Leveled twice).

**Upper Tract,** 1.4 miles southwest of, 500 feet southeast of William Halloway's dwelling, north side of road at ford crossing, in large rock; chiseled square, "T. B. M. 1,586"

Feet.

painted on rock....................................1,584.74

**Upper Tract**, 2.6 miles southwest of, 2,000 feet south of small dwelling house, west side of road, in root of large maple tree; copper nail and washer "T. B. M. 1,667" marked on tree ..............................................1,665.68

**Upper Tract**, 4.1 miles southeast of, northeast end of dwelling on Gardner Bogg's farm, 100 feet west of road, in base of chimney; bronze tablet stamped "1,776 W. Va."..........1,774.313

**Upper Tract**, 8.1 miles southwest of, northeast side of road, in large boulder; chiseled cross mark, "T. B. M. 2,965" on rock ..............................................2,962.46

**Upper Tract**, 9.0 miles southwest of, northwest side of road, in large flat rock; chiseled square, "T. B. M. 2,905" painted on rock..............................................2,903.13

**Upper Tract**, 9.9 miles southwest of, 10 feet east of intersection of roads, south side, in large flat rock; bronze tablet stamped "2,273 W. Va."..................................2,270.593

**Upper Tract**, 10.9 miles southwest of, south side of road, in root of large chestnut tree; copper nail and washer, "T. B. M. 2,105" painted on tree............................2,102.69

**Upper Tract**, 11.09 miles southwest of, 200 feet south of Paul Pheris's dwelling, south side of road, in root of white oak tree; copper nail and washer, "T. B. M. 2,110" painted on tree..............................................2,107.47

**Riverton**, 1 mile northwest of, at intersection of roads, northwest end of wooden bridge, in support log; copper nail and washer, "T. B. M. 1,776" painted on bridge..........1,773.89

**Riverton**, 2.4 miles northeast of, 150 feet north of Sarah E. Herman's barn, 10 feet east of road, in large flat rock; bronze tablet stamped "1,749 W. Va."...................1,746.655

**Riverton**, 3.5 miles northeast of, 10 feet west of road, in large chestnut stump; copper nail and washer, painted "T. B. M. 1,743"..............................................1,740.34

**Riverton**, 4.4 miles northeast of, 845 feet north of T road, east of road, in large rock; chiseled square, "T. B. M. 1,675," painted on fence post..................................1,673.05

**Macksville**, 30 feet north of post-office, 5 feet east of road in large flat rock; bronze tablet stamped "1,627 W. Va."....1,625.091

**Macksville**, 0.9 mile northeast of, 100 feet north of T road, southwest end of wooden bridge, copper nail and washer, marked "T. B. M. 1,623"..............................1,620.79

**Macksville**, 2.0 miles northeast of, west side of road in root of large oak tree; copper nail and washer, marked "T. B. M. 1,597" ..............................................1,594.36

**Mouth of Seneca**, 200 feet north of post-office, at intersection of roads, in large boulder; bronze tablet stamped "1,569 W. Va." ..............................................1,566.588

**From Mouth of Seneca northeast along road down North Fork of Potomac River to point 2.6 miles southwest of Hopeville.**

**Mouth of Seneca**, 1.0 mile north of, in triangle, in center of road, small rock; chiseled square, "T. B. M. 1,518" painted on post..............................................1,515.32

**Mouth of Seneca**, 1.9 miles northeast of, west side of road, at gate, in root of large oak tree; copper nail and washer, "T. B. M. 1,524" painted on tree.......................1,521.61

**Mouth of Seneca**, 3.3 miles northeast of, 800 feet south of road

Feet.

leading west, west side of road, in flat rock; bronze tablet stamped "1,473 W. Va."............................1,470.701

**Mouth of Seneca**, 4.6 miles northeast of, 30 feet west of Saw Mill Run, 15 feet south of road, in root of large sycamore tree; copper nail and washer, "T. B. M. 1,425" painted on tree ..............................................1,422.43

**Mouth of Seneca**, 5.6 miles northeast of, 60 feet south of Mount Pleasant U. B. Church, 10 feet west of road, in large boulder; chiseled cross mark, "T. B. M. 1,476".....1,473.39

**Mouth of Seneca**, 6.7 miles northeast of, 70 feet south of Carr Schoolhouse, 40 feet west of road, in large painted boulder; bronze tablet stamped "1,694 W. Va."...........1,691.397

**Mouth of Seneca**, 7.7 miles northeast of, 30 feet south of Zecke Run, 10 feet east of road, in large boulder; chiseled square, marked "T. B. M. 1,587"........................1,594.68

**Mouth of Seneca**, 8.7 miles northeast of, 500 feet southwest of Will Heavener's dwelling, east side of road, in south end of wooden culvert; copper nail and washer, "T. B. M. 1,446" on fence.........................................1,443.06

**Mouth of Seneca**, 9.8 miles northeast of, 375 feet west of High Ridge Run, 10 feet south of road, in large boulder; bronze tablet stamped "1,379 W. Va."..................1,376.333

**Mouth of Seneca**, 10.9 miles northeast of, west side of road, in small rock; chiseled square, "T. B. M. 1,529" painted on tree..............................................1,526.38

**Mouth of Seneca**, 11.9 miles northeast of, 800 feet north of Long Hollow School, east side of road, in root of large oak tree; copper nail and washer, marked "T. B. M. 1,346" ..............................................1,343.14

**From north border of quadrangle south to Hopeville. (Part of line from Scherr in which an error of 0.6 foot has been adjusted in Greenland Gap, Davis, and Onego Quadrangles).**

**Scherr**, 15.6 miles south of, 700 feet south of point where road crosses Jordan Run, at turn in road, west side of road, in large flat rock; bronze tablet stamped "1,285 W. Va."..1,284.254

**Scherr**, 16.6 miles south of, 25 feet south of private road at entrance to Hopeville Gap, west side of road, in large flat rock; chiseled square, rock marked "T. B. M. 1,385".....1,384.87

**(Line enters Petersburg Quadrangle).**

**Hopeville**, 15 feet west of Jordan Run, 115 feet south of Perry Robaugh's dwelling, in root of large sycamore tree; copper nail and washer, "T. B. M. 1,106" marked on tree.....1,105.44

**From point 2.6 miles southwest of Hopeville along highways northeast to Hopeville. (Leveled twice).**

**New Hopeville**, 1.0 mile southwest of, 180 feet north of Red Creek road, west side of road, in large rock; bronze tablet stamped "1,477 W. Va."..............................1,474.401

**Hopeville**, southeast of Amos Dolly's store-house, north side of road, in root of large maple tree; copper nail and washer, "T. B. M. 1,152" painted on tree..........................1,149.13

Feet.

**Hopeville**, 0.2 mile south of, opposite Hopeville Schoolhouse, east of road, in root of large poplar tree; copper nail and washer, marked "T. B. M. 1,122"....................... 1,119.11

**Hopeville**, 15 feet west of Jordan Run, 115 feet south of Perry Robaugh's dwelling, south of road, in root of large sycamore tree; copper nail and washer, "T. B. M. 1,106" on tree ................................................ 1,105.438

From Mouth of Seneca along highways northwest of Days Mills (Harperton P. O.).

(Line enters Horton Quadrangle).

**Mouth of Seneca P. O.**, 200 feet north of post-office, at intersection of roads, in large boulder; bronze tablet stamped "1,569 W. Va."............................................. 1,566.588

**Mouth of Seneca P. O.**, 1.0 mile west of, north side of road, in large rock; chiseled square, "T. B. M. 1,748" painted on rock ................................................ 1,745.55

**Mouth of Seneca P. O.**, 2 miles west of, 400 feet west of road leading south, south side of road, in large boulder; chiseled square, "T. B. M. 1,757" painted on boulder.......... 1,754.88

**Onego**, 30 feet north of J. R. Adamson's store, 100 feet south of Roaring Creek, east side of road, in large boulder; bronze tablet stamped "1,764 W. Va.".................. 1,761.139

**Onego**, 1.0 mile northwest of, opposite Luther Hoffman's dwelling, 15 feet west of road, in large flat rock; chiseled square, marked "T. B. M. 1,841"....................... 1,838.82

**Onego**, 2.0 miles northwest of, north side of road, in large boulder; chiseled square, boulder marked "T. B. M. 1929". 1,926.88

**Onego**, 3.1 miles northwest of, 500 feet south of wooden bridge over Horse Camp Run, east side of road, in large flat rock; bronze tablet, stamped "2,170 W. Va."............. 2,167.501

**Onego**, 4.1 miles northwest of, in ledge of rocks, east side of road; chiseled square, "T. B. M. 2,661" painted on rocks.. 2,658.71

**Onego**, 5.2 miles northwest of, 700 feet south of road leading east, west side of road, in small rock; chiseled square, "T. B. M. 3,212" painted on telephone-pole.............. 3,209.06

**Onego**, 6.4 miles northwest of, 250 east of road leading south, north of road, in large boulder; bronze tablet stamped "2,977 W. Va."...................................... 2,974.180

**Harperton P. O.**, 15 feet west of J. C. Harman and Company's store, north side of road, in large boulder; chiseled square, "T. B. M. 2,752" painted on boulder..................... 2,750.02

From west border of quadrangle east along highways to point 1.0 mile southwest of New Hopeville.

**Red Creek Junction**, 1.8 miles southeast of, at gate leading to J. W. Mullennux farm, 100 feet west of Big Run, south side of road in flat rock; bronze tablet stamped "2,355 W. Va."............................................. 2,352.915

**Red Creek Junction**, 2.9 miles east of, 550 feet east of Henry Hoffman's dwelling, north side of road; chiseled square, painted "T. B. M. 2,325" on fence post.................. 2,322.23

**Red Creek Junction**, 4.0 miles east of, south side of railroad grade, in root of large beech tree; copper nail and washer, marked "T. B. M. 2,358"............................... 2,355.85

Feet.

**Laneville,** 100 feet west of post-office, 125 feet north of road, in large pointed rock; bronze tablet stamped "2,516 W. Va." ....2,513.758

**Laneville,** 1.1 miles east of, south side of Red Creek, at road crossing in large rock; chiseled square, painted "T. B. M. 2,612" ....2,609.27

**Laneville,** 2.1 miles east of, on Red Creek road, south side, in large flat rock; chiseled square, painted "T. B. M. 2,997"..2,994.39

**New Hopeville,** 7.4 miles west of, on Red Creek road, north side of road, in large boulder; chiseled square, "T. B. M. 3,734" painted on rock....3,731.22

**New Hopeville,** 7.1 miles west of, on Red Creek road on National Forest Reservation, north side of road, in large boulder; bronze tablet stamped "3,888 W. Va."....3,885.700

**New Hopeville,** 6.1 miles west of, on Red Creek road, 50 feet east of Big Spring, north side of road, in large boulder; chiseled square, "T. B. M 3,919" on rock....3,916.29

**New Hopeville,** 5.1 miles west of, on Red Creek road, 1,000 feet north of woods road, west side, in large rock; chiseled square, "T. B. M. 3,368" painted on rock....3,365.68

**New Hopeville,** 4.1 miles west of, on Red Creek road, 1,500 feet west of Robert Havenor's cabin, south side of road, in large rock; bronze tablet stamped "2,838 W. Va."....2,835.037

**New Hopeville,** 3.1 miles west of, on Red Creek road, north side, in large ledge of rocks; chiseled square, marked "T. B. M. 2,442" on rocks....2,438.88

**New Hopeville,** 2.1 miles southeast of, on Red Creek road, south side, in ledge of rocks; chiseled cross, marked "T. B. M. 1,927"....1,924.53

**New Hopeville,** 1.0 mile southwest of, 180 feet north of Red Creek road, west side of road, in large flat rock; bronze tablet stamped "1,477 W. Va."....1,474.401

## DAVIS QUADRANGLE.

(Latitude 39°-39° 15′; longitude 70° 15′-79° 30′).

**From Dobbin southwest along Western Maryland R. R. to Thomas.**

**Dobbin,** 700 feet north of station, in west end of north abutment of railroad bridge, in capstone; bronze tablet stamped "2,582"....2,582.003

**Henry,** 800 feet north of station, in top of boulder, north of track; chiseled square....2,642.96

**Henry,** opposite station, top of rail....2,645.23

**Henry,** 1.07 miles south of, in top of boulder, north of track; chiseled square....2,668.87

**Wilsonia,** 1.08 miles north of, 1,700 feet north of mile-post "C 29" in flat slab of rock, east of track; bronze tablet stamped "2,673 W. Va."....2,672.994

**Wilsonia,** opposite station, top of east rail....2,725.6

**Wilsonia,** 0.27 mile south of, opposite mile-post "C 70", in top of rock east of track; chiseled square....2,746.76

**Kempton,** in north end of station platform; copper nail....2,856.39

**Beechwood,** 800 feet south of, in top of boulder, west of track; bronze tablet stamped "2,901 W. Va."....2,900.912

Feet.

**Fairfax**, 0.6 mile north of, in ledge east of track; chiseled square ......2,995.41
**Fairfax**, in switch-block opposite station; copper nail......3,038.71
**Fairfax**, 0.62 mile south of, in southeast corner of concrete base of shaft for locomotive coaling station; bronze tablet stamped "W. Va. 3,052"......3,051.785
**William**, in north end of station platform; copper nail......2,984.88
**Thomas**, 1 mile north of, 25 feet southeast of mile-post "C 77" in top of boulder; chiseled square......2,971.85
**Thomas**, water-level, above the Davis Company's dam......2,960.2
**Thomas**, on east side of station, top of rail......2,948.2
**Thomas**, in southwest corner of Davis Coal & Coke Company's office; aluminum tablet stamped "2,986 Adj 1903"......2,986.062

**From near Childs Crossing east along Davis Branch Western Maryland R. R. to Davis. (Leveled twice).**

NOTE: Between Childs Crossing and the first bench mark of this line the two runnings differed 0.5 foot and the lesser value was assumed to be correct but a third line should have been run.

**Davis**, 3 miles southwest of, on Western Maryland R. R. in capstone of north abutment east wing of railroad bridge; chiseled square marked "U. S."......3,043.73
**Francis**, opposite north end of station, top of rail......3,084.8
**Davis**, 2 miles southwest of, on Western Maryland R. R., in mile-post north of track; iron spike......3,099.55
**Davis**, 1 mile west of, on Western Maryland R. R. in top of boulder south of track, 400 feet west of mile-post; chiseled square......3,140.56
**Davis**, in steps of Blackwater Hotel; bronze tablet marked "Blackwater Hotel"—"Buck-1910" 3,100. 462 (Private Survey) ......3,100.657

**From Davis along highways southeast to Cortland, thence south and west to Red Creek Post-office.**

**Davis**, east end of Williams Street, in highway bridge over Beaver Creek, west abutment, south wing; bronze tablet stamped "3,079"......3,079.073
**Blackwater River**, bridge over, water elevation......3,081
**Davis**, 0.75 mile east of, on highway to Canaan Valley, 150 feet south of small wooden bridge, in top of boulder, west of road; chiseled square......3,157.22
**Davis**, 2 miles southeast of, on highway to Canaan Valley, 400 feet south of small wooden culvert, west of road; on top of boulder; chiseled square......3,537.01
**Davis**, 3 miles southeast of, on highway to Canaan Valley, near summit of mountain, 0.1 mile east of small wooden bridge, in face of flat outcrop of rock, south of road; bronze tablet stamped "3,676"......3,675.831
**Cortland**, 2 miles north of, on highway to Davis, in top of rock projecting from bank, west of road; chiseled square......3,579.72
**Cortland**, 1 mile north of, on highway to Davis, near Maple Grove School, in flooring of sheep scales east of road; copper nail......3,222.33

Feet.

**Cortland,** 35 feet east of south end of highway bridge over North Branch of Blackwater River, in top of fragment of ledge; bronze tablet stamped "3,163"....................3,162.481
**Cortland,** 1 mile south of, in root of pine tree, 60 feet northeast of Cortland Church; copper nail....................3,214.98
**Cortland,** 2 miles south of, in gate-post at the Thompson place, east of road; iron spike....................3,244.33
**Blackwater River,** bridge over....................3,216.54
**Blackwater River,** water-level....................3,209
**Buena, P. O.,** 1 mile north of, 450 feet north of road fork at Cosner School, in top of outcrop of limestone ledge, 10 feet west of right of way in field; bronze tablet stamped "3,263"....................3,262.619
**Cosner School,** T. P. at road fork....................3,303.1
**Buena P. O.,** T. P. at road fork, 0.5 mile north of....................3,298.8
**Buena P. O.,** 125 feet north of, west of highway, in top of limestone ledge; chiseled square....................3,266.03
**Buena P. O.,** 1 mile south of, at fork of road near Harr Schoolhouse, in top of rock at south end of small culvert; chiseled square....................3,261.21
**Red Creek P. O.,** 0.5 mile east of, in top of boulder, south of road; chiseled square....................2,801.33
**Red Creek P. O. (Flanagan Hill),** at fork of Dry Fork road with Canaan Valley road, at northeast corner of Hedrick's blacksmith shop, in top of slab of rock; bronze tablet stamped "2,556"....................2,555.434

**From Dobbin along Dobbin Lumber R. R. south and west to Camp No. 9, thence west along highways to Cortland.**

NOTE: After applying rod and orthometric corrections an error of 0.54 foot was adjusted in this line in 33 miles.

**Dobbin,** 1 mile east of, east of railroad, in top of boulder; chiseled square....................2,712.15
**Dobbin,** 1.75 miles east of, north of track in top of boulder; chiseled square....................2,866.11
**Red Oak Creek,** bridge over....................3,069.1
**Red Oak Creek,** water-level....................3,057
**Red Oak Water-Tank,** rail, opposite....................3,112.9
**Dobbin,** 3 miles east of, 550 feet east of Red Oak Water-Tank, in large sandstone rock north of track; bronze tablet stamped "3,131"....................3,130.962
**Red Oak Water-Tank,** 0.9 mile east of, at crossing of gas pipe-line, in top of rock south of track; chiseled square...3,252.40
**Old Gatzmer Coal Mine,** 1.4 miles west of, in switch-block, west of track; copper nail....................3,296.57
**Old Gatzmer Coal Mine,** in sandstone ledge, north of track, bronze tablet stamped "3,251"....................3,251.580
**Bridge over Beaver Creek**....................3,266.4
**Beaver Creek,** bridge level....................3,205
**Old Gatzmer Coal Mine,** 0.8 mile east of, 200 feet east of trestle over Beaver Creek, in top of boulder, west of track; chiseled square....................3,229.63
**Canaan Water-Tank,** 2.14 miles west of, in top of boulder, north of track; chiseled square....................3,425.60
**Canaan Water-Tank,** trestle, 1.28 miles north of....................3,499.5

Feet.

**Canaan Water-Tank,** 0.6 mile north of, in sandstone ledge jutting out from bank east of track; bronze tablet stamped "3,535"....................................3,535.368

**Canaan Water-Tank,** 870 feet south of, in top of boulder, east of track; chiseled square................................3,590.59

**Canaan Water-Tank,** elevation of west rail, opposite.........3,582.4

**Camp No. 5,** 300 feet west of, in top of boulder, west of track; chiseled square..........................................3,642.69

**Stony River Dam Junction,** 1000 feet west of, at summit of mountain, 200 feet west of Babcock Lumber Company's fence, in sandstone boulder east of track; bronze tablet stamped "3,686"..........................................2,686.900

Top of north rail at Dam Junction.................... .... 3,692.26

**Stony River Dam Junction,** 1 mile east of, at switch in jutting rock east of track; chiseled square......................3,708.10

**Stony River Dam Junction,** 1.6 miles southeast of, west of track in top of boulder; chiseled square................3,733.58

**Camp No. 6,** 1 mile north of, in top of sandstone boulder west of track (1.1 miles north of highest point on railroad); bronze tablet stamped "3,796"..........................3,796.148

**Camp No. 6,** rail opposite......................................3,959.39

**Camp No. 6,** 1,100 feet south of, at highest point on railroad, in switch-block of wye; copper nail.....................3,984.64

**Camp No. 6,** 1.1 miles south of, in sandstone boulder northeast of track; chiseled square................................3,961.88

**Camp No. 7,** Junction of track to..........................3,898.93

**Camp No. 8,** 1.3 miles north of, east of track, in small sandstone boulder on edge of right of way; bronze tablet stamped "3,852"..........................................3,852.268

**Red Creek,** bridge over headwaters of.......................3,775.0

**Red Creek,** surface of water, June 13, 1916..................3,770.3

**Pulp Job Camp,** bridge 330 feet south of....................3,752.7

**Camp No. 8,** 1,000 feet north of, in switch-block of wye; copper nail..............................................3,733.56

**Camp No. 8,** track at north end of..........................3,717.9

**Red Creek,** bridge over, 0.53 mile south of Camp No. 8.......3,703.2

**Camp No. 8,** 1.25 miles southwest of, 150 feet east of small wooden bridge, in top of boulder, north of track; chiseled square ..................................................3,777.24

**Camp No. 8 and Camp No. 9,** crest of hill between..........3,880.7

**Camp No. 9,** 250 feet west of, on south side of wye, in large boulder, north of track; bronze tablet stamped "3,801"...3,800.836

**Cortland,** 3.5 miles east of, at highest point in trail from farm of Jason Harmon to Dobbin Lumber Camp No. 9, in top of flat slab of rock; chiseled square......................4,048.53

**Cortland,** 2 miles east of, 150 feet southeast of farm house of Jason Harmon, on top of sandstone boulder in barn yard, north side of road; chiseled square painted "3,266.4".....3,266.21

**Cortland,** 0.9 mile east of, 200 feet northwest of wooden highway bridge over Blackwater River, east of highway, in top of boulder; chiseled square..........................3,188.25

**From Davis northeast along highways to old Gatzmer Coal Mine.**

**Davis,** 1.0 mile northeast of, 30 feet southeast of rocks in small stream bed, south of wooden culvert, on sandstone rock; chiseled square painted "3,084.6"........................3,084.66

Feet.

**Davis,** 2.4 miles northeast of, 30 feet west of tracks, on stone; chiseled square painted "3,085.2"........................3,085.26

**Davis,** 3.3 miles northeast of, 160 feet south of wooden trestle over Beaver Creek, south side of track, in sandstone boulder; bronze tablet stamped "3,094 1916", boulder painted "3,093.9"........................................3,094.076

**Davis,** 4.3 miles northeast of, 20 feet north of tracks, on sandstone rock; chiseled square, rock painted "3,105"........3,105.17

**Davis,** 5.5 miles northeast of, on west side of tracks, on sandstone rock; chiseled square, rock painted "3,111.3".......3,111.35

## SECONDARY ELEVATIONS.*

"Secondary elevations from records and topographic maps of the United States Geological Survey, including vertical-angle determinations, altitudes of well-known summits, and other useful elevations, are given below. These elevations are approximate only and should not be used for accurate work."

| Place. | Quadrangle. | Elevation Feet. |
|---|---|---|
| Backbone Mountain triangulation station.. | Parsons ....... | 3,661 |
| Pointy Knob............................ | Piedmont ...... | 4,286 |
| Shaver triangulation station............... | Parsons ....... | 3,554 |
| Wiess Knob.............................. | Piedmont ...... | 4,490 |

*From pp. 155-6 of Bulletin 632, U. S. Geological Survey.

# INDEX

## E

## I



## J



## K